DOCUMENT RESUME

ED 221 714 CE 033 892

AUTHOR Dennis, Bill; Poston, David
TITLE General Safety Manual for Vocational-Technical Education and Industrial Arts Programs. Bulletin No. 1674.
INSTITUTION Louisiana State Dept. of Education, Baton Rouge. Div. of Vocational Education.
PUB DATE 82
NOTE 275p.

EDRS PRICE MF01/PC11 Plus Postage.
DESCRIPTORS Accident Prevention; Educational Resources; *Industrial Arts; *Laboratory Safety; Postsecondary Education; Safety; *Safety Education; Safety Equipment; School Safety; *School Shops; Secondary Education; State Curriculum Guides; Test Items; Transparencies; *Units of Study; *Vocational Education
IDENTIFIERS Louisiana

ABSTRACT

This manual is designed to offer suggestions for teaching safety in Louisiana industrial arts and vocational education programs. The suggestions and information presented are intended for use in an ongoing safety program, not a short unit presented at the beginning of the school year. Following an introduction in unit 1, the material has been broken into eight additional units that address specific considerations necessary to safety in programs. Unit 2 discusses the responsibilities of various persons as they relate to safety, while unit 3 offers suggestions for the development of a safety program that meets the needs of the unique situation in every industrial arts-vocational education laboratory. In unit 4, the instructor's responsibility for teaching students the safe way to perform the various activities in the different industrial and vocational curriculum areas is addressed. Most commonly recommended safety regulations are outlined in unit 5, while unit 6 is devoted to procedures for making safety inspections designed to ascertain if the laboratory is as hazard-free as possible. Recommendations for making advanced preparations for emergencies are the focal point of unit 7. Finally, units 8 and 9 provide a system for recordkeeping and present sample tests for general safety understanding. Transparency masters are provided with many of the units. Appendixes contain signs and safety instructions for machines, a list of resources, and supplemental safety instruction packets for automotive, carpentry/woodworking, electricity/electronics, machine shop, small engines, and welding courses. (KC)

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ED221714

STATE OF LOUISIANA

DEPARTMENT OF EDUCATION

Bulletin No. 1674

1982

GENERAL SAFETY MANUAL

for

VOCATIONAL-TECHNICAL EDUCATION

and

INDUSTRIAL ARTS PROGRAMS

Issued by

Office of Vocational Education

N. J. Stafford, Jr.
Assistant Superintendent

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CE033897

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TABLE OF CONTENTS

Foreword.....i

Acknowledgements.....ii

Credits.....iii

Disclaimer.....iv

UNIT I—Introduction.....1

UNIT II—Responsibilities for Safety.....12

UNIT III—Developing a Safety Program.....19

UNIT IV—Safety Instruction: A Teacher's Responsibility.....22

UNIT V—Safety Instructions Common to all Shop/Lab Areas.....25

UNIT VI—Inspecting for Safety.....37

UNIT VII—Emergency Action.....44

UNIT VIII—Safety Recordkeeping.....63

UNIT IX—Sample Tests for Knowledge of Safety Common to all Shop Areas.....78

A P P E N D I X

Industrial Safety Color Coding.....A1

Machine Guarding.....A3

Safety Signs, Tags and Posters.....A7

Sources of Safety Information.....A15

SUPPLEMENTAL SAFETY INSTRUCTIONAL PACKETS

Automotive.....S1

Carpentry/Woodworking.....S11

Electricity/Electronics.....S52

Machine Shop.....S60

Small Engines.....S83

Welding.....S100

Emergency Numbers Page.....(inside back cover)

FOREWORD

Potentially dangerous situations and possible health hazards which may lead to accident and injury exist in all areas of modern public educational institutions no matter how conscientious the instructors and administrators may be. The duties of today's educator must include not only imparting knowledge and experience, but also being constantly alert to possible danger zones and taking measures to diminish the likelihood of perilous incidents and their consequences. Because of the nature of the equipment and activities inherent to industrial arts and vocational education programs, such hazardous situations may be more of a problem in these programs than in other types of programs. It follows that the industrial arts/vocational education instructor needs to be even better informed on ways to avoid pitfalls as well as how to deal with those which do occur.

The first and perhaps the most important step in achieving that goal is safety instruction. Many experts believe that such instruction should be presented to the student before he/she welds the first piece of metal, cuts the first board, or places the first wrench to an engine. However, safety training should not be limited to one unit, but included in the program throughout the year as an item of special emphasis. This manual is designed to offer suggestions for teaching safety in Louisiana industrial arts and vocational education programs.

J. KELLY NIX
State Superintendent of Education

ACKNOWLEDGEMENTS

This publication represents the cooperative efforts of personnel in the Department of Industrial Education and Technology at Northwestern State University and the Vocational Curriculum Development and Research Center, Natchitoches, Louisiana. Special recognition goes to Dr. Bill Dennis and Mr. David Poston, who served as project co-directors and writers in the development of this guide. Special thanks goes to Ms. Beth Akin, NSU graduate student, who worked diligently to help make this publication a reality.

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CREDITS

During the course of preparing a document such as this, thoughts and materials are incorporated from many sources. The compilers of this safety manual wish to thank and show credit, so far as we know, to those from whom we "borrowed" these thoughts and material.

Maryland State Department of Education, Division of Vocational-Technical Education, Industrial Programs Branch. Health and Safety Resource Guide for Trades and Industry and Industrial Arts Programs in the Maryland Education System. 1979.

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Utah State Board of Education. Industrial Education Safety Guide. Revised. 1979.

DISCLAIMER

Compilation of this publication has involved reference to sources believed to be reliable and most representative of current opinion on this subject. Every possible attempt has been made to present this information to the extent deemed necessary to meet the needs of the average industrial arts and vocational education program. However, no claims as to the absolute reliability and completeness, in all situations, of the materials presented are made by the contributors to the publication or by the Office of Vocational Education, Louisiana State Department of Education. The persons involved offer no warranties or guarantees and will assume no liability or responsibility in connection with any fallacies. In addition, instructors using this manual should be aware that it is not designed to be exhaustive in presenting safety measures, or that other standards might not be necessary under particular or unusual circumstances or conditions.

Permission to reproduce all or part of this manual for further promotion of industrial arts and vocational education safety is granted.

UNIT I

INTRODUCTION

Purpose of this Guide

This safety manual has been prepared to assist school administrators and instructors in the development of comprehensive safety programs, and to help instructors make safety an integral part of every course. Safety regulations and suggestions for teaching basic safety principles are also central to this publication.

The above information has been supplemented with detailed explanations of responsibilities for safety, advice about safety instructions, recommended emergency procedures, and sample tests for general safety knowledge. Finally, the appendices to this guide provide lists of resources, industrial safety color coding, machine guarding, safety signs, and a page of emergency telephone numbers.

It is hoped that this manual will serve as a source book and guide for the development of comprehensive safety and health programs in all vocational education and industrial arts locations. In addition, it is intended to provide resources for the inservice training of instructors and for the education of students in teacher education programs.

Use of this Guide

The suggestions and information presented in this guide are intended for use in an ongoing safety program, not a short obligatory unit presented at the beginning of the school year. The importance of integrating safety into the total instructional program cannot be overemphasized. Students should be constantly reminded that safety must become an everyday consideration in their work in the industrial arts and vocational education laboratory. In short, safety should be a practical learning experience, not just a means to learning information necessary for passing an exam.

This manual was designed to help administrators and instructors plan and implement the kind of safety training that will result in every student realizing that "the right way to perform any task is the safe way!" Proper use of the suggestions presented here should result in a program through which every student becomes safety-conscious.

The material has been broken into nine units that address specific considerations necessary to every good safety program. Unit II discusses the responsibilities of various persons as they relate to safety. Unit III offers specific viable suggestions for the development of a safety program which meets the needs of the unique situation in every industrial arts/vocational education laboratory. It addresses such areas as developing accident/injury policies and procedures, evacuation plans, and preventive maintenance schedules.

In Unit IV, the instructor's responsibility for teaching students the safe way to perform the various activities in the different industrial and vocational curriculum areas is addressed. Suggestions for making the instruction as interesting and meaningful as possible for students are also included.

Most commonly recommended safety regulations are outlined in Unit V, while Unit VI is devoted to procedures for making safety inspections designed to ascertain the laboratory is as hazard-free as possible.

Recommendations for making advance preparation for emergencies are the focal point of Unit VII.

Finally, Units VIII and IX provide a system for recordkeeping and present sample tests for general safety understanding.

Items in the Appendices are designed for practical use. In addition to signs and safety instructions for machines, there is a list of resources which might be used to supplement this manual.

It is recommended that school instructors and administrators become thoroughly familiar with the contents of this guide. Then they may use Unit III to assist in the procedure of developing comprehensive safety programs, to include a school safety program and a supplemental safety program for each technical/subject area.

Need for Safety Instruction

The past 100 years have seen tremendous strides in technological advancements which have served to greatly improve the quality of living. At the same time, those same advances which have so enriched our lives have resulted in a corresponding increase in dangers. At the dawn of the 20th century, more than 50 of every 100,000 workers were accidentally killed on the job. However, during the past 70 years, accidental deaths of American technical and industrial workers have been reduced by approximately two-thirds.

The reduction appears to have begun in 1912 when the first organized effort to reduce the death toll was initiated. Today, industrial safety courses, which are an important part of many training programs, have helped to drastically reduce the number of persons killed and/or injured in American industries. Presumably, effective safety education leads to attitudes and safety-consciousness which result in safe work practices.

Available statistics should be enough to convince the average educator of the necessity of including safety education in their curriculums. Experience has shown that accidents can be prevented through properly planned and implemented training. Such a program should include not only the removal of all unnecessary dangers, but the strategy to avoid accidents. Each student must be able to operate every machine in the safest possible manner.

We must recognize the importance of attitudes and skills possessed by every industrial worker and student to the safety of the individual and every person who works with him/her. In doing so, the question for the educator becomes, "If I don't teach safety, who will?" Obviously, the logical time for learning safety measures is during training in basic use and principles for each industrial arts and vocational education skill. Once a person learns to perform a task in a given manner, it is very difficult for him/her to relearn it in a different way. Therefore, each student must learn the best way, the right way, and the safe way the first time.

School administrators and instructors have three very basic reasons for establishing and maintaining effective safety programs. They are moral, economic, and legal.

Moral Reasons for Safety Programs

The first of these, the "moral" aspect, has already been mentioned. Basically, it presumes that every instructor is also a human being, and as such, has an innate desire to care for and protect others, perhaps especially those who are younger or less informed as students often are. The definition of the moral aspect therefore states that instructors should naturally possess a predisposition to do all they can to keep people from suffering and being killed.

Financial Reasons for Safety Programs

The adage, "It costs more to have accidents than it does to safeguard against them," is true! This applies to schools as well as to businesses. Consideration must be given to monetary losses that could result from injury to students, staff, and visitors, as well as from property damage, destruction of tools and materials, legal counsel, loss of jobs, etc.

More specifically, financial losses could be suffered in the event of an accident, including, for example: replacing tools and equipment, reconstructing and equipping buildings, or repairing broken items. Administrative time required to fill out accident reports could also result in financial loss. Obviously, if an instructor or administrator were judged to be legally liable for injury to a student, he or she might be required to pay medical costs or fines, or might even face possible imprisonment.

In the long run, accident prevention programs are less expensive than accidents!

Legal Reasons for Safety Programs

Legally, instructors and administrators are responsible for the health and safety of students entrusted to their care. Students are considered by law to be under the charge and guidance of the teacher to

whom they are assigned at any given time. They look to instructors for training and example, which the law expects educators to provide.

Further, certain safety regulations and provisions are required by local, state and federal governments. In some cases, judges or juries might find an instructor responsible for an accident, or could convict him or her of failing to act in a "prudent and responsible manner."

Summary

In summary, the best way to prevent losses in an industrial arts or vocational education program is to prevent accidents, and the best way to prevent accidents is to teach every person preparing for industrial work to be safety-conscious. Good safety instruction doesn't simply happen, and it is a mistake to assume that merely because an institution has adopted a safety instruction program on paper, it is doing all it can to prevent accidents. Instruction in safety measures must be treated with the emphasis necessary to make it a natural part of the work atmosphere. Every person must give active service to the principles taught, not just lip service. Only then can the administration and instructors feel they have truly met their responsibilities.

OSHA

The Occupational Safety and Health Act of 1970 (OSHA) was passed by Congress "to assure, as far as possible, every working man and woman in the U.S. safe and healthful working conditions, and to preserve our natural resources." Provisions of the Act establish specific standards designed to reduce occupational accidents, thereby reducing injury and death rates of workers. It also outlines employer and employee responsibilities and rights in an attempt to attain the safest possible work environment.

Basically, the act states that the employer shall provide a work area "free from recognized hazards that are causing or are likely to cause serious harm" for each worker. The employee's responsibilities, the Act states, include compliance with "all occupational safety and health standards, rules, regulations and orders issued," emphasizing use of prescribed protective equipment.

In addition to these general requirements, OSHA provides instructions for filing complaints and keeping records to verify compliance. The legislation also includes provisions for inspection of industries, and penalties which may be charged for violations of regulations.

Many states have adopted their own occupational safety and health acts which must be "at least as stringent as those outlined by the National Act." Louisiana has not. Industries in this state must therefore comply with the Federal safety and health standards.

Government agencies and public educational institutions, however, are not covered by the OSHA provisions. However, Section 603(5) of the Comprehensive Employment and Training Act of 1973 (CETA) requires all projects under the Act to establish and maintain standards for health, safety and other conditions that are applicable to the performance of work and training.

Even if your school or institute is not required to comply directly with OSHA provisions, every school administrator, instructor and student should make every effort to comply with those safety standards. In the event of an injury our courts often hold the OSHA safety and health provisions to be the standard by which business and school personnel alike, are to be held accountable.

LIABILITY IN SCHOOL SHOP ACCIDENTS

It must be the goal of all educators and administrators to attempt to reduce the rate of accidents to zero. However, for a number of reasons as complex as human beings themselves, it will be impossible to eliminate accidents entirely from our schools.

Because of lab or shop environment and activities, there is a greater risk of injury in industrial arts' and trades' and industries' programs than in classroom-type courses. Regardless of OSHA and regardless of other emphasis upon safety in industry and in our schools, accidents still occur. It is with this knowledge that this topic of liability is addressed here.

In actuality, reduction of legal involvement should be a secondary function of a school safety program. Yet, it is true that the best way to reduce the possibility of legal suits because of school shop accidents is to provide an accident-free learning environment. As a result, legal involvements will diminish.

The teacher is not relieved of liability by having the student's parents sign a waiver slip to approve of the student's engaging in hazardous activities in the school. While this may be an acceptable public relations procedure, a parent cannot sign away a student's right to file a tort liability suit.

If an individual is injured during school activities, there may be an attempt to gain compensation for the injured person by proving that the instructor and/or school administrators contributed to the injury through negligence. What constitutes negligence is a question of fact in all cases. Negligence, which is basically a failure to exercise due care, is the primary problem in establishing liability.

One may be judged liable if it can be shown that the injuries to another were the direct result of improper actions on the part of the defendant. A teacher cannot be held at fault in cases where his or her own actions had no reasonable connection with the injury.

The best protection from liability a teacher has lies in the conscientious and continuous use of caution in all cases in which it is possible for student injury to occur. A safety education program practiced by the teacher and students is the key to avoiding liability cases.

Presented on the following pages are shop practices leading to the liability of school personnel and procedures designed to eliminate such practices. (Pennsylvania Department of Education, Pennsylvania Industrial Arts Safety Guide, Second Edition, 1981, pp. 18.4-18.8.)

•SHOP PRACTICE: The Absence of the teacher from the shop when students are working therein.

Administrative practices and instructional activities designed to eliminate such practices as a factor in teacher liability include:

1. Never absent yourself from the shop while students are working in the shop.

2. Have a clear understanding with your principal and/or supervisor that you are not to be called from the shop during a class session.

3. Only under extreme necessity should you absent yourself from the shop. When this occurs, lock the main switch box and provide a sedentary or reading assignment to students during your absence.

•SHOP PRACTICE: Teachers leaving the shop under the supervision of a teacher who is not qualified to teach shop work.

Administrative practices and instructional activities designed to eliminate such practices as a factor in teacher liability include:

1. Teachers are likely to be absent for a period of time due to illness or attending a teachers' meeting or conference. It is the practice of school administrators to staff the shop with any instructor who has a free hour available.

2. Do not permit a substitute teacher in your shop unless he or she is a qualified or certified instructor.

3. If none is available, prepare written or reading assignments in advance, or some type of sedentary activity where they will not be using the machines and equipment in the shop. Instructional movies or similar aids are practical if they fit into the instructional program.

•SHOP PRACTICE: Permitting students not enrolled in the class to use shop equipment and tools.

Administrative practices and instructional activities designed to eliminate such practices as a factor in teacher liability include:

1. Permit only those students who have participated in your shop program or who are participating to use the shop and equipment.

2. No exceptions should be made to this practice.

3. Do not take the word of a student that he has had previous instruction or experience in the purpose and use of a tool.

•SHOP PRACTICE: Permitting students to use machines or tools or to perform activities for which instruction has not been given.

Administrative practices and instructional activities designed to eliminate such practices as a factor in teacher liability include:

1. Ensure that proper instruction is given relative to each basic operation to be performed by a student in the shop class.

2. Permit no student to use a machine or tool in performing an operation for which instruction has not been given.

3. Keep an accurate instructional log as to those materials, machine, and tools, and operations pertaining thereto in which instruction has been given.

•SHOP PRACTICE: Pupils using equipment in the shop that has not been approved by the administration and board of education.

Administrative practices and instructional activities designed to eliminate such practices as a factor in teacher liability include:

1. Allow no student to bring in any item of equipment for use in the shop.

2. Permit students to use only those items of tools and machines that have been purchased with the approval of the board of education and school administration.

•SHOP PRACTICE: Permitting students to work in the shop during free periods, particularly when the shop is not supervised.

Administrative practices and instructional activities designed to eliminate such practices as a factor in teacher liability include:

1. Do not be absent from your shop when students are working, even during unscheduled classes or periods.

2. Permit students to use equipment and to work in the shop during designated periods when proper supervision is given.

•SHOP PRACTICE: Permitting students to use dull tools and/or cutting devices on machines.

Administrative practices and instructional activities designed to eliminate such practices as a factor in teacher liability include:

1. Periodically inspect all cutting edges of power tool devices and hand tools.

2. Keep all items of equipment properly maintained and sharpened.

3. Demonstrate the proper maintenance and care of cutting edges of safe hand tools, particularly for those jobs within the ability of the student to perform.

•SHOP PRACTICE: Permitting students to perform operations on machines without guards, particularly when guards could have been used.

Administrative practices and instructional activities designed to eliminate such practices as a factor in teacher liability include:

1. Provide proper instruction as to the use and adjustment of guards, emphasizing the necessity and functions of such a device.

2. Set an example yourself, by using guards and safety devices at all times, and perform operations as you would want them performed by students.

3. Require that students use guards at all times on machines when such devices can be used.

4. Have students secure permission to use any item of equipment. This will permit you to check on the machines to see that all guards and safety devices are properly adjusted.

•SHOP PRACTICE: Allowing the use of equipment by students who are prone to accidents or who possess physical abnormalities that may cause an accident.

Administrative practices and instructional activities designed to eliminate such practices as a factor in teacher liability include:

1. Be familiar with the work habits of students and with those who possess physical abnormalities which may necessitate restrictions being placed on their use of equipment.

2. Require all students to secure permission before the use of any item of equipment.

3. Limit such students to the use of machines that are within their capabilities and commensurate with whatever physical abnormalities they possess.

•SHOP PRACTICE: Sending pupils outside the shop to perform activities for the school or other departments.

Administrative practices and instructional activities designed to eliminate such practices as a factor in teacher liability include:

1. Do not permit any students to leave the shop to perform activities outside the department.

2. Refuse to undertake projects or jobs that require students to work away from the shop without your continuous supervision.

3. Confine instructional and maintenance activities to those that can be performed in the shop.

•SHOP PRACTICE: Failure to keep accurate written reports relative to accidents.

Administrative practices and instructional activities designed to eliminate such practices as a factor in teacher liability include:

1. Prepare an accident form for your shop if the school system does not have a standard form.

2. Fill out the form as soon after the accident has taken place as possible. Make multiple copies and keep one for yourself.

•SHOP PRACTICE: Failure to secure written statement from witnesses to shop accidents.

Administrative practices and instructional activities designed to eliminate such practices as a factor in teacher liability include:

1. Provide a place on your accident report form for the listing of witnesses.

2. Have witnesses write, in their own words, their views as to how the accident happened.

3. Have witnesses sign their signature to their statements.

•SHOP PRACTICE: Failure to administer safety tests to students in case of liable suit for negligence.

Administrative practices and instructional activities designed to eliminate such practices as a factor in teacher liability include:

1. Administer safety tests to students upon completion of the demonstration of a specific machine, tool or process.

2. Keep tests on file in your office as evidence that such material has been covered and that a test of the material was actually administered.

3. Set a critical score above which students must achieve in order to use a specific item of equipment. Many instructors demand a perfect paper prior to letting students use such equipment.

•SHOP PRACTICE: Failure of the teacher to exercise the utmost caution.

Administrative practices and instructional activities designed to eliminate such practices as a factor in teacher liability include:

1. Use every means to eliminate the possibility of an accident occuring. The teacher MUST anticipate where ahd how an accident will occur.

2. Make every possible effort to provide the safest possible physical facilities, and implement an effective safety instructional program.

Contributory Negligence: The term "contributory negligence" can be interpreted in a very broad sense. However, the following suggestions are given with a view in mind of eliminating the possibility of a teacher's being charged with "contributory negligence":

a. Maintain the safest working conditions in the shop.

b. Insist on safe practices being adhered to at all times in the shop.

c. Provide complete and proper instruction in all aspects of shop work, with regard to the use of tools, machines, and materials.

d. Make recommendations to your superiors as to improvements that can be made to better safety conditions in the shop.

e. Make improvements suggested by your superiors.

f. Establish safety rules and enforce them.

g. Organize and implement a "complete" and continuous safety education program.

•SHOP PRACTICE: Failure to effectively administer a comprehensive eye safety program.

Administrative practices and instructional activities designed to eliminate such practices as a factor in teacher liability include:

1. Be familiar with, and conversant about, eye safety legislation.

2. Require all students to wear eye protection devices at all times for laboratory activities.

3. Know the appropriate eye safety device for each operation.

4. Set an example yourself by always wearing the appropriate eye protection devices.

UNIT II

RESPONSIBILITIES FOR SAFETY

In each school situation, the instructor and school administrators have the legal responsibility for accidents that involve students or visitors while they are within the school setting. This responsibility may also extend to supervisors, local school boards, the Office of Vocational Education, the State Department of Education, and even the State Board of Elementary and Secondary Education. Students and parents are also charged with responsibilities for safety. Each has a role to play which should develop acceptable attitudes and desirable behavioral patterns in all persons involved.

Responsibilities of the State Department of Education

Ultimate responsibility for safety instruction rests with the State Department of Education, this task being shared with the Board, the State Superintendent, the division heads, and the state supervisors. However, those closest to the classroom activities will have the largest burden of the daily routine of carrying out an effective safety program.

The State Department of Education should:

1. Set policies for safety program development and implementation.

2. Provide funding for safe facilities and safety equipment.

3. Provide expert assistance to vocational/technical schools and individual parish school systems in the development of accident prevention programs.

Responsibilities of Local School Boards and Superintendents

The parish school system controls the budget, the curriculum, and the personnel policy to a major degree. Without parish-level support, safety program effectiveness will, at best, be spotty, implemented by dedicated personnel and ignored by others.

The following functions are considered the responsibility of the school board and the superintendent in a comprehensive safety education program:

1. Provide separate funding for facility maintenance and improvements, and safety supplies and equipment necessary to produce a safe instructional environment.

2. Provide for the inservice training of teachers in the area of safety.

3. Appoint a person in the parish school system to be responsible for coordinating safety and adopt a job description which reflects that responsibility. Such a safety coordinator would have the following responsibilities:

   A. Coordinate school safety functions.

   B. Set up school safety committees.

   C. Provide for, and participate in, school safety inspections.

   D. Establish a communication system to keep teachers and administrators abreast of new standards and procedures.

   E. Provide for, and assist in, establishing teacher inservice training programs.

   F. Provide for and assist in the implementation of safety instruction programs for students.

   G. Provide for and assist in the investigation of and recording of accidents and injuries.

   H. Research special safety problems.

   I. Obtain and disseminate regulatory material (policies, guidelines, inspection checklist, posters. etc.)

   J. Analyze and report all accidents. (See suggested accident report in this document.)

Responsibilities of the Director, Principal and/or Department Head

The individual school is the key organization for accident prevention. The school administrator is likely to be the person who is most directly responsible for the school's industrial arts/vocational-technical safety program. If a specialized supervisor or department head functions with the principal, or director, and works directly with the teachers, some of the responsibilities may be delegated.

The following functions are considered the responsibility of the school administrator in a comprehensive safety program:

1. Secure support from, and maintain liaison with administration above your level.

   A. Secure approval for the safety education program.

   B. Secure adequate budgetary support.

C. Expedite building and equipment changes necessary for safety.

D. Arrange for the procurement of safety equipment.

E. Ensure that appropriate staff members are kept informed of the specific maintenance requirements for safe operation of vocational education/industrial arts facilities.

F. Carefully select instructors for specific knowledge and ability to establish safe practices, procedures, and environment.

G. Arrange for administrative measures to reduce the liability exposures of staff members.

2. Provide leadership in safety program planning.

A. Initiate a specific program of safety education.

B. Set up instructorial inservice training in accident prevention.

C. Encourage the instructional staff to maintain first aid proficiency. Require that safety supplies and emergency handling procedures are current and properly organized.

D. Encourage the instructional staff to be knowledgeable and proficient in the use of fire fighting equipment.

E. Instruct the staff members in the use of this safety manual and the development of a comprehensive safety program.

3. Secure action on a program of safety education that will involve not only the vocational education/industrial arts student, but the entire student body.

A. Check periodically to make sure an adopted safety education program is in effect.

B. Observe teachers for assurance that safety instruction is a functioning part of the course of study.

C. Stimulate the discovery, analysis, and prompt correction of unsafe conditions or practices.

D. Support teachers in enforcing safety regulations.

E. Receive and review accident reports.

F. Use acceptable parish and/or state procedures for investigating and analyzing accidents.

4. Provide safe facilities and services.

   A. Report to higher administration personnel unsafe conditions which cannot be corrected at the school level.

   B. Plan with teachers for the correction of unsafe conditions and other hazards, and for the installation of safety devices.

   C. See that facilities are inspected regularly for the condition of equipment, and safety devices, proper housekeeping, and adequacy of exits, ventilation, and material handling systems. Make necessary improvements as indicated by the inspection review.

   D. See that safety and applicable safety regulations are specifically reviewed in the planning of new or remodeled facilities.

   E. Provide class sizes that are in keeping with the capacity, square footage, and the number of work stations available in each facility.

   F. Provide a procedure for the removal of students who repeatedly violate established safety rules and regulations and are thereby identified as safety hazards.

5. Secure the cooperation of outside personnel and agencies.

   A. Assist teachers in locating qualified community personnel and services that can provide resources for the safety program.

   B. Encourage qualified outside individuals to become involved in the school shop safety programs.

   C. Establish communication with parents and members of the community for developing a positive attitude toward safety and the school safety program.

Responsibilities of the Teacher

The major responsibility for laboratory safety instruction in accident prevention falls on the teacher. The following are considered the responsibilities of the teacher in a comprehensive accident prevention program in school laboratories:

1. Incorporate safety instruction in the course of study and maintain documentation as to who received instruction and when instruction was given.

2. Present instruction on potential hazards and accident prevention specific to the particular school laboratory.

3. Instigate a comprehensive safety program for your particular school laboratory.

4. Develop specific safe practices, rules, and regulations relating to your facilities, and provide for their enforcement.

5. Keep informed of new and accepted safe practices for accident prevention.

6. Provide proper instruction in the use of all tools, machines and equipment. Keep a record of each student's attendance, safety training, and safety evaluation.

7. Require that a student be enrolled in your program and receive the required safety instruction prior to working in the laboratory.

8. Set a proper safety example for students to follow.

9. Insist that adequate eye protection be worn in the shop at all necessary times.

10. Insist on proper protective equipment in the shop areas, and require students to wear proper clothing and adequate hair guards while working in the laboratory.

11. Devise and enforce safe housekeeping procedures.

12. Insist that guards meeting accepted standards be provided and used whenever a machine is operated.

13. Establish and maintain the safest possible working environment.

14. Have set, preplanned procedures in case of an accident or emergency.

15. Provide prompt and thorough reports of accidents, including:

    A. A written report by the instructor.

    B. Written accounts by witnesses.

    C. Photographs of the accident scene and conditions.

16. Always provide for the supervision of students in the classroom or laboratory in accordance with legal requirements.

    NOTE: Do not leave the classroom unsupervised at any time when students are present.

17. Be aware of the emotionally disturbed and accident-prone student.

18. Regularly review laboratory facilities to maintain safe conditions. Give special attention to:

    A. The layout

    B. Utilities and building services

    C. Equipment guarding

    D. The storage and condition of tools

    E. The storage, labeling, and handling of materials

19. Make recommendations to administrators for improving safety conditions.

20. Implement recommendations of the administrator for improving safety instruction.

Responsibilities of Students

The students should recognize that because of their lack of experience they must take extra care to use their best judgment always and to safeguard themselves and others while working in the shop. However, each student must assume some of the responsibility for his/her own safety and that of classmates. The student has responsibilities, as follows:

1. Work within the bounds of school policies and safety regulations

2. Develop desirable behavioral patterns and attitudes by accepting directions, advice, and counsel from instructors

3. Accept personal responsibility for assisting in the safety program and working toward its success

RESPONSIBILITIES OF STUDENTS FOR SAFETY

1. WORK WITHIN THE BOUNDS OF SCHOOL POLICIES AND SAFETY REGULATIONS.

2. DEVELOP DESIRABLE BEHAVIORAL PATTERNS AND ATTITUDES BY ACCEPTING DIRECTIONS, ADVICE, AND COUNSEL.

3. ACCEPT PERSONAL RESPONSIBILITY FOR ASSISTING IN THE SAFETY PROGRAM AND WORKING TOWARD ITS SUCCESS.

UNIT III

DEVELOPING A SAFETY PROGRAM

The primary objective of an accident prevention program for school shops and labs is to prevent accidents which might cause injury or harm to students, instructors, other school personnel, or visitors, or which might damage facilities and equipment. This effort is immediate and urgent. It must go into effect on the opening day of school and continue throughout the course of all school activities.

Even though the instructor must assume the primary role in safety education, in effect, there must be two major focal points for safety program development. That is, each vocational-technical school, high school, junior high school, or other educational institution must establish school-wide safety policies and procedures in the development of a school safety program. Then each teacher or subject team must go beyond planning the general safety program and develop a program for his or her particular technical teaching area.

In developing safety programs, school administrators, supervisors, and teachers must keep the following objectives in mind: the development of school, classroom and shop policies that will provide guidelines for safe actions in all predicted situations; the development of printed materials that will communicate sound safety practices to all persons associated with the school; and the development of instructional procedures and safety promotional programs to help each student gain a sense of responsibility for his or her own safety and the safety of others.

In developing a school-wide safety program, the following content is recommended for inclusion in the safety manual:

A SAFETY PROGRAM FOR _____ SCHOOL

I. Statement of Philosophy or Policy (regarding accident prevention)

This section should include statements about the importance of having an effective safety program and state the school administration's concern about the safety of students, visitors, and others.

There should be further discussion about the need to protect equipment, tools, and other tangible items furnished with taxpayers' money.

II. Safety Instruction and Exams

This section of the school safety program manual should set forth the school's policies on all aspects of general safety and health as they relate to the school environment.

Information on the procedures that each student can expect in the labs should also be presented here. These may include machine demonstrations by instructors, safety discussions, and the established procedures for administering, grading, recording, and readministering safety exams.

III. Inspection Programs

This section of the general safety manual should include an explanation of the school's policies regarding inspection for preventive safety measures. Included should be descriptions of inspection by instructors, by student inspection teams, and by independent inspection groups as desired and/or required.

Inspection checklists should be adopted or developed for use in inspections. (Please refer to the suggested inspection checklist included in Unit VI of this safety manual.)

IV. Preventive Maintenance Program

This section should explain the general school plan or recommendations for preventive maintenance on all equipment and tools. Industrial housekeeping procedures and schedules should also be included.

V. Student Organization for Safety Control

The school's policy or recommendations for student involvement in the safety program should be presented in this section.

Student members chosen by the student body should be included on the school safety committee. (A grade point average or other prerequisites may be required of the student committee members.)

The student members of the safety committee will assist with all decisions and recommendations of the safety committee, and will particularly solicit the cooperation of students in safety training and practice. They will also help plan safety promotion and publicity and they will assist in the review of any accidents.

VI. Emergency Action Plan

This section should detail the school plan for procedures to be followed by <u>everyone</u> in the event of any emergency. Plans should include actions and procedures for such emergencies as fire, tornado, major accident or injury, bomb threat, flood, hurricane, and others. (Refer to Unit VII of this safety manual.)

VII. Promoting Safety Awareness

Recommendations for promoting the safety program among all administrators, faculty, and students should be presented. Included for consideration should be safety contests, posters, award programs, notices in the school paper or bulletin, suggestion systems, bulletin board displays, and others.

In addition to the school-wide safety program, each technical area within the school should develop its own supplementary material or manual for its specific use.

In addition to the general safety program developed for school-wide use, the technical-area supplementary materials should include the following:

1. Safety instructions for the safe operation of each power tool or piece of equipment used in the work/learning activities of each course.
2. A shop or lab maintenance program.
3. A shop/lab clean-up plan.
4. A student organization plan for inspection and other matters of safety related to each particular technical area.

UNIT IV

SAFETY INSTRUCTION—A TEACHER'S RESPONSIBILITY

Regardless of the various persons who may be held legally responsible for the health and safety of students and others in the school setting, the ultimate responsibility for an effective safety program must rest heavily upon each teacher. That is, if an instructor does not place much value on promoting safety and safety education, the safety program will not be effective in that instructor's classroom/shop situation. On the other hand, if an instructor actively promotes and emphasizes safety in his or her teaching situation, there will be an effective safety program in that technical area.

The instructor is responsible for safety instruction as well as for academic and technical instruction. Therefore, the instructor must accomplish the following objectives:

1. Develop in each student a sense of responsibility for his/her own safety and that of others.

2. Help students understand that the safe way to do something is the effective way.

3. Help students become familiar with unsafe acts and unsafe conditions that may lead to accidents.

4. Help students learn safe practices for use in all their day-to-day activities.

5. Encourage students to become a "team member" in the total school safety program.

How to Plan for Teaching Safety

Being an effective teacher of safety, as in teaching any other discipline, requires extensive planning and effort. The following are some suggestions for planning for safety instruction.

1. Read this publication completely. Become familiar with its contents.

2. Locate general safety instructions for industrial arts and vocational-technical programs. Also refer to supplemental safety materials available for your specific technical area.

3. Use the prepared safety instructions as a guide in preparing your complete lesson plans on general safety and the correct use of tools and equipment.

4. Plan your instruction and demonstrations so they will emphasize safe practices as needed for safe performance in your instructional program and as covered in your safety exams.

5. Duplicate your set of safety instructions. The safety instruction sheets can be used for: (a) reviewing by class members; (b) orienting new students; and (c) posting on equipment.

Providing Safety Instruction

During actual instruction periods, the following should be included in safety education:

1. Provide instruction on what to do in case of a shop accident.

2. Give periodic shop demonstrations on the proper use and care of personal protective devices.

3. Provide for safety instruction in the course of study.

4. Provide instruction in the maintenance of shop tools, machines, and other equipment.

5. Provide instruction in the safe methods of lifting and/or moving heavy equipment or other loads.

6. Provide a bulletin board for safety bulletins, safety posters, and safety rules and regulations.

7. Give periodic shop talks to emphasize the importance of each student's acquiring the proper attitude toward accident prevention.

8. Conduct field trips to industrial plants or construction jobs to study safety practices.

9. Provide a safety suggestion box for student use.

10. Provide for visiting speakers from business and industry to speak on occupational safety and health practices.

11. Prepare for the shop a written safety education program similar to the course of study.

12. Require each student to sign information sheets dealing with shop safety rules and regulations to indicate that he/she has read and understood the information. These sheets should be kept on file until the student completes the course of instruction.

13. Prepare a written safety education program for the shop and submit it to the school administrators for their information.

14. Incorporate single concept films and other audio-visual aids into the instructional procedures to emphasize safety and, especially, safe machine operation.

Enforcement of Safety Rules

Safety rules should be enforced as a means of accident prevention. In the school shop this responsibility rests squarely on the shoulders of the teacher, and he/she should be able to present proof of enforcement. Moreover, it should be pointed out to teachers that the enforcement of safety regulations can be enhanced by setting a good example. If a teacher performs a particular operation in a dangerous manner, the pupils will assume that this is an acceptable way to do it.

Evaluating Safety Instruction

Safety exams should be administered to all students and kept on file. This will: (a) make it possible for the instructor to evaluate his or her safety instruction, (b) cause all students to acknowledge their understanding of the safe way to work and learn in an environment of tools and equipment, and (c) furnish written proof that safety instruction has been given. Proceed as follows for a safety instruction evaluation:

1. Using the suggested safety exam for general safety and the safety exams for your specific technical area (if available), develop your own safety exams.

2. Duplicate your exams and administer them to each student before he or she begins active work in a lab situation.

3. Evaluate the safety exams.

4. Require each student to correct any test item that was answered incorrectly.

5. Record each student's exam as being completed and file the exams.

UNIT V

SAFETY INSTRUCTIONS COMMON TO ALL SHOP/LAB AREAS

Almost all accidents that occur in vocational education and industrial arts labs and shops are attributable to one of the causes listed below:

1. Taking unnecessary chances
2. Getting in too big a hurry
3. Showing off
4. Lack of information
5. Preoccupation of the mind
6. Distraction of attention
7. Fear
8. Experimenting
9. Failure to follow instructions
10. Poor discipline
11. Defective machinery
12. Improperly guarded machinery
13. Faulty layout
14. Faulty installation
15. Physical defects in material on machine parts
16. Excitement
17. Selfishness
18. Improper clothing
19. Poor health

Note that approximately 20 percent of all accidents are caused by mechanical failure (unsafe conditions), whereas approximately 80 percent of all accidents are caused by human failure (unsafe acts).

The safety regulations that follow offer specific, tangible suggestions for avoiding these common pitfalls and reducing the chance of accident and/or injury.

It is suggested that these safety instructions be used as examples in writing instruction sheets for each school situation, or that these safety instruction sheets be copied directly and used in the instructional program.

General Safety Instructions

1. No horseplaying or practical joking in any shop area.
2. Never take chances.
3. Observe all posted safety notices and posters.
4. Know where fire extinguishers are located and how to use them.
5. Insure that the ventilation system is operating for your work station or area.
6. Secure approval of your instructor on all work you plan to do. This applies to all projects and assignments in which you use shop equipment and tools.
7. Report immediately to your instructor upon incurring any injury, even though slight.
8. Caution any person you see violating a safety rule.
9. Report to the instructor any equipment that does not seem to work properly.
10. Keep tools and materials from projecting over the edge of benches, whenever possible, so someone will not walk into them and get injured.
11. Follow prescribed safety instructions in handling large, heavy, and long pieces of material. In general, never carry material over six feet in length or over 50 pounds in weight without assistance.
12. Practice designated procedures to use in case of earthquake, fire, or other emergency.
13. Walk, do not run, in all shop areas.
14. Be considerate of the safety of others.

15. Adhere to safety rules pertinent to a specific shop.

16. Report unsafe conditions to the instructor.

17. Never throw any object in the shop; an accident or an injury may result.

18. Never use compressed air for other than specific purposes.

19. Make certain hands and tools are free of oil and grease.

20. Clean work stations and place tools in the proper areas at the end of each class period.

21. Study fire regulations pertinent to the shop so that you can assist in closing windows, making proper exits, etc.

22. If you feel ill, do not operate a machine. Report to your instructor.

23. Use proper lifting techniques when moving heavy objects.

24. Never treat or remove particles from the eye. See your instructor or school health personnel for immediate attention.

Safety Instructions for Personal Protection

1. Wear proper eye protection while participating in activities that may endanger your eyes.

2. Be sure clothes are safe and suitable for shop work. Remove or fasten any loose clothing. Roll loose sleeves above your elbows. Keep hair away from equipment in operation. Students with long hair must confine their hair in nets or caps when around tools and equipment.

3. Rings, bracelets, watches, and other jewelry must be removed when working in labs/shops.

4. Wear gloves when materials such as rough boards, metal subject to burrs or sharp edges, glass, or other such materials are handled.

5. Wear protective clothing and equipment for the use intended for its wear. Avoid wearing gloves or anything else that may be pulled into a machine.

6. Wear a respirator when harmful dust or fumes exist.

7. Use face shields during hazardous operations in cutting metal, wood, or similar material.

8. Never use flammable liquids for cleaning purposes.

9. Wear rubberized protective equipment when working with electricity.

10. Wear ear protection when excessive noise is encountered.

11. Wear helmets and hand shields when performing operations that produce intense radiant energy like arc welding and heavy gas cutting.

12. Wear canvas or heavy cotton work gloves for operations when the main hazards are blisters caused by friction. When heat is involved, like foundry work, a more protective type of glove or mitten should be worn.

13. Wear safety shoes with steel toes when lifting heavy objects or working around them.

14. Shop coats, aprons, or coveralls should be worn for general body protection against dirt and grease.

15. Remove ties when working around machine tools or rotating equipment.

16. Use soap and water frequently as a method of preventing skin disease.

Safety Instructions for Use of Equipment and Tools

1. Use the right tool for the job.

2. Never leave a machine while it is running.

3. Observe rules governing operator's zones around tools and machines.

4. Use a brush or piece of wood to clear away dry chips from your machine or bench. (The machine must be turned off and have come to a complete stop.)

5. Secure permission from your instructor for using machines and have special set-ups approved.

6. Do not use tools or equipment until instruction relative to safe handling has been given.

7. Persons not operating power tools or instructed to observe the operation thereof, should keep clear of operators.

8. Do not stop or start a machine for another person except in an emergency.

9. Machines must be operated by only one person at a time.

10. Do not use machines for trivial operations, or when hand tools would best accomplish the task.

11. Do not tamper with adjustments or play with machinery at any time. Serious accidents may result.

12. Do not lean on machines. You may press a switch or throw a control which, upon starting, could endanger the safety of the operator or damage the machine.

13. Stop all power machinery to oil, adjust, or clean.

14. Allow revolving machinery to stop on its own. Resist the desire to grab chucks, spindles, or other rotating parts with the hand.

15. Use power tools only when your instructor is present in the room.

16. Set up shields to stop flying chips, sparks or particles.

17. Replace grinding wheels showing cracks, those out of balance, or those worn too small to allow proper clearance (not more than 1/8") between the tool rest and stone.

18. Keep cutting tools sharp.

19. Never mount a grinding wheel unless the speed of the motor and the speed of the wheel are known, and the two are appropriate.

20. When starting a machine, allow it to reach its operating rpm before using it.

21. When finished with a tool, clean and return it to its proper location.

22. Ensure that vise handles hang free when not in use.

23. Know and follow the specific requirements of the kind and type of machine you are operating.

24. Enclose all gears, moving belts, and other power transmission devices, or erect barricades to prevent contact.

25. Operate equipment only after passing a test for safe operation for that machine.

26. Do not use defective tools, machines, or other equipment.

27. Do not remove guards and safety devices.

28. Observe specific safety zones designated by the instructor and become familiar with color codes.

29. Do not talk with other students while operating machines.

30. Observe safety rules posted at or near potentially hazardous machines.

31. Do not operate any machine until you have received proper instruction, and fully understand how to operate it.

32. Have your instructor check special machine setups.

33. Check machines and make all adjustments before turning on the power.

34. Make sure other persons are clear before turning on the power.

35. Be sure the guards are in place and function properly.

36. Start and stop your own machine, and remain with it until it has come to a complete stop.

37. Never leave a running machine unattended.

38. Allow a safe distance between your hands and blades, cutters, or moving parts. Keep your fingers in such a position that there is no danger of their slipping into the cutter or moving parts.

39. Keep machines clear of tools, stock, and other items.

40. Keep the floor around the tools clear of liquids, scraps, tools, and other material.

41. Give the machine your undivided attention when using it. Never look away for any reason.

42. Notify your instructor of any breakage or malfunction.

43. Allow all machines to come to a complete stop before removing work or making a new setup.

44. Use the proper size and type of hand tool for the specific task.

45. Make sure that all cutting tools are sharp and in good condition before using them.

46. Handle edged or pointed tools by the handles, with sharp points or edges pointed away from you and others.

47. When using sharp-edged tools, be sure to direct their action away from yourself and your classmates.

48. Clamp small work on a bench, or secure it in a vise, when using gouge or wood chisel or driving screws.

49. Control chisels, gouges, and carving tools with one hand while the other supplies the power.

50. When chipping or cutting with a cold chisel, arrange your work so that classmates are protected from flying chips.

51. Pass tools to other persons with handles forward.

52. Carefully read instruction sheets before operating machines.

53. Avoid using wrenches that do not properly fit the nuts, bolts, or other objects which they are being used to turn.

54. Develop a respect for machine tools and understand their purpose.

55. Recognize the distinctive sound of a properly adjusted and smooth-running machine tool.

Safety Instructions for Flammable and Combustible Liquids

Flammable and combustible liquids are categorized by their ease of ignition. Flammable liquids are more easily ignited than combustible ones. Examples of flammables are gasoline, acetone, and lacquer thinner. Examples of combustibles are kerosene, fuel oil, mineral spirits, and brake fluid.

Flammable and combustible liquids are essential in many vocational/technical and industrial arts classes. They must be stored and used in a manner that will provide a high degree of safety. Before using any of these materials, the label on the container must be read. Flammable and combustible liquids are potentially dangerous because:

1. Many produce vapors that are heavier than air and can accumulate along floors or other low points, lying in wait for a stray spark.

2. Many are readily oxidized, or release heat, so that rags or waste coated with them will catch fire spontaneously.

3. Vapors from some have harmful effects and can cause damage to nervous and/or waste elimination systems of the body.

4. All are poisonous if taken internally.

5. Most will remove protective oils from the skin, and repeated exposure can cause dermatitis (skin rash).

6. Nearly all will burn violently. Such fires are difficult to extinguish without proper extinguishing agents.

7. When burning, most flammable liquids will produce dense black smoke that may drive you from the room before the fire can be put out.

Some of the more hazardous flammable liquids that you may encounter in your shop activities are (listed in approximate order of hazard):

**Aerosol cans
Gasoline
*Catalyst M.E.K. peroxide
Carburetor cleaner
Acetone
Lacquer and lacquer thinner
Adhering liquid (for silk-screen process)
Paint thinner
Alcohol
Shellac
*Japan dryer
Kerosene
Paint
Resin (polyester)
Stain and varnish
Danish oil

*These materials could accelerate spontaneous combustion or could react violently when mixed with organic material.

**The hazard could vary greatly depending upon the propellant used in the can.

Store and handle flammable and combustible liquids safely, as follows:

1. Be sure the exhaust fan or vents are operating in the store room or area in which flammable liquids are stored.

2. Draw out only as much as you need for your class period or particular operation. Keep only in a safety container approved by the Underwriter's Laboratory. Label container with the name of the contents.

3. Dump waste or excess materials only in covered metal containers, as directed by the instructor. Care should be taken to avoid mixing liquids, the mixture of which cause a chemical reaction.

4. Use a funnel when pouring into a small container.

5. Clean up spills and drips immediately, disposing of the rags and waste materials as instructed.

6. Read and follow instructions for handling and mixing catalysts with resins or finishes.

7. Never pour catalysts back into the bottle.

8. Always add the catalyst to the resin, not the resin to the catalyst.

9. Never apply resin, paint, or other finishing material near areas used for cutting, welding, grinding, or other hot work.

10. Be sure that the working area is well ventilated.

11. Store thinners and solvents only in original purchase containers or approved safety containers.

12. Use rubber gloves to minimize chances of skin irritation when working with epoxy and polyester resins.

13. Wash hands and other exposed skin areas before leaving the shop.

14. All flammable materials should be stored in closed containers when not in use.

15. Have storage cabinets distinctly marked "FLAMMABLE—KEEP FIRE AWAY."

16. Use only approved cleaning solutions.

17. Avoid contact of carbon-removing or paint-stripping compounds with your skin.

18. Keep the top of oil drums and the surrounding area clean and free of combustible materials.

19. Properly dispose of unwanted flammable liquids and combustible materials daily.

20. Use a solvent only after determining its properties, what kind of work it has to do, and how to use it.

Electrical Safety Instructions

1. Know where electrical circuit breakers are located for an emergency shutoff.
2. Keep electrical boxes closed.
3. Ground all portable and stationary power tools.
4. Keep hoses and electrical cords from becoming tripping hazards.
5. Do not use electric drills or other electrical apparatus while standing on wet floors.
6. Cords are to be disconnected when portable tools are not in use.
7. Check for frayed electrical cords.
8. Disconnect electrical power equipment before oiling, clearing, or making adjustments.
9. Do not use extension cords for permanent connections.
10. Ground all motors, fuse boxes, switch boxes, and other electrical equipment.
11. Assume that an electrical apparatus is "hot" and treat it as such.
12. Use a test lamp or a suitable meter for testing a circuit.
13. Never turn on a switch unless you know what it operates.
14. Turn off power when replacing a fuse.
15. Locate and correct the fault that caused the circuit breaker to open or the fuse to blow before turning on the power.
16. Be sure a circuit is protected against an overload by a fuse or circuit breaker of correct circuit-carrying capacity.
17. Make changes in the wiring of a circuit only when the power is turned off.
18. Select and use wire of the correct current-carrying capacity.

Shop Housekeeping Practices

1. Keep your work station clean and orderly.

2. Keep passageways clear to allow easy movement while working and to allow for a rapid exit in case of an emergency.

3. Keep the floor clear of scraps and litter.

4. Keep bench and cabinet drawers and locker doors closed to avoid hazards while walking.

5. Wipe up any liquids spilled on the floor immediately; then apply oil-absorbing compound to the area.

6. Avoid storing or placing objects overhead, except where adequate storage space is provided.

7. Provide a nonskid surface for floors.

8. Sweep daily, and clean thoroughly periodically, all shop/lab work areas.

9. Put stock away promptly after using it.

10. Ventilate shops properly. Serious disorders can be caused by uncontrolled vapors, mists, gases, and fumes.

11. Keep shop areas neat and orderly in appearance at all times. Cluttered or dirty shops are good sites for accidents. Neat and orderly shops help eliminate unsafe working conditions.

12. Maintain proper light levels in shops and study areas. Sight is essential for safety. Keep windows, light bulbs, reflectors, and walls bright but without glare. Replace burned out bulbs at once.

13. Daily remove all sawdust, shavings, metal cuttings, and other waste materials.

14. Place all scrap stock in the designated containers.

15. Keep the classroom and shop orderly and clean with all tools and materials in their proper place.

16. Do not throw anything on the floor. Put it in the trash can.

17. Keep all clean-up equipment in its proper place when not in use.

UNIT VI

INSPECTING FOR SAFETY

Any total safety/accident prevention program must include both periodically scheduled and unscheduled inspections. Such inspections not only help to assure that the vocational education and industrial arts laboratories are the safest they can possibly be, but are also instrumental toward making sure the shop complies with safety provisions.

Constant changes caused by movement of materials, depletion of supplies, and accumulation of waste are a fact of life in the average industrial education laboratory. At the same time, changes are made every class period resulting in new students involved in various kinds of activities, as well as movement of the same student from one project to the next. Thorough, systematic inspections help to keep everyone who works in the shop alert by providing an incentive to keep both equipment and supplies in their proper place, despite the inevitable constant traffic.

Other, more specific purposes for conducting safety inspections include:

1. To comply with state and federal health and safety laws, as applicable.

2. To conduct an annual inspection of the facilities and activities to reduce or eliminate hazards and potential accidents.

3. To conduct target area inspections to evaluate potentially high-accident frequency activities or areas.

4. To investigate an event that involves serious injury to a person.

5. To investigage a complaint of an unsafe or unhealthy situation that exists at the work site or as a part of a normal accident investigation program.

Inspections based on a specific safety checklist should, therefore, be made several times a year by several different groups or individuals. They might include any of the following or any "inspectors" appropriate to a given institution.

1. A school-wide student committee and/or student committees from each shop/lab area. Generally, it is advised that student assignments for such committees be rotated, and that every member be made aware of his/her responsibility.

2. Committees composed of teachers, administrators, and support staff. Committee members should be trained as to what to look for, and made to realize that their responsibility is to recognize possible hazards, not necessarily to provide solutions.

3. Committees from the central office. Again, if this procedure is followed, adequate training should be provided to those selected.

4. Maintenance staff. Inspections could be conducted as a part of regular maintenance duty, provided proper in-service training were offered.

5. Departmental representatives. Principals or directors would require that instructors conduct their own inspections, and report potential dangers.

6. Outside inspectors. This would include the fire marshall and OSHA official(s). Even if your school is not under the jurisdiction of federal OSHA provisions, upon the request of school officials, OSHA officials in your region will make complementary safety inspections to determine how closely the school shop/labs are in compliance with minimum safety standards.

Types of Inspections

Several or all of the following types of inspections should be conducted in the vocational education and industrial arts facilities, as the need of the particular institution dictates.

1. Periodic inspections. Scheduled to be made at regular intervals: daily, weekly, monthly, semi-annually, annually or suitable periods. These should be planned in advance and should cover the entire shop situation.

   These periodic inspections should include checking all types of fire protection equipment, as well as inspecting for fire hazards. At the same time, all other equipment should be checked for worn parts and possible problems, and needed equipment should be carefully surveyed.

2. Intermittent inspections. Made at irregular intervals as the need arises. They may be unannounced and concentrate on any specific area of the shop. The need for such inspections is usually dictated by accident analysis, or an unusual number of accidents or injuries to determine reason or action.

3. Continuous inspections. Every institution should designate students to spend a predetermined amount of time observing and inspecting operations and equipment in the shop. Positions on the committee should be rotated to allow the optimal number of students the learning experience supplied by such responsibilities. A special emphasis in such intermittent inspections should be personal protective equipment.

4. Special inspections. Sometimes required because of installation of new equipment, introduction of new operation or process, remodeling or repair, or to investigate and analyze following accident, injury, fire or other hazards. Other special inspections might be conducted as part of a special emphasis such as an open house or a specially designated week.

Procedure for Conducting Inspections

The primary objective of any inspection program, whatever type chosen, should be to determine whether or not everything is satisfactory. If problems are detected, emphasis should be placed on finding the causes, not placing the blame. Basically, the inspectors should do three things:

1. DETECT: Examine the laboratory and its activities for possible hazards and unsafe practices.

2. ANALYZE: Examine the hazards and unsafe practices detected in step 1 for potential accident producing capabilities.

3. CORRECT: Recommend measures to solve the problems.

Most inspectors use some type of checklist similar to the one presented here as a guide for conducting inspections. Annually, the following categories should be considered:

1. The condition of building and facilities.

2. The layout of work area with respect to the location and guarding of machines and equipment.

3. Access to and from the work area and the adequacy of aisles and storage areas.

4. The flow of materials through the shop, including disposal of scraps.

5. The handling of hazardous materials.

6. The control of hazardous materials and processes.

7. Lighting, noise, ventilation, heat and humidity, vibration and other related environmental exposures.

NATIONAL STANDARD SCHOOL SHOP SAFETY INSPECTION CHECK LIST

Prepared by the Joint Safety Committee of the
AMERICAN VOCATIONAL ASSOCIATION — NATIONAL SAFETY COUNCIL

Date _____

INTRODUCTION

A safe environment is an essential part of the school shop safety education program. The safe environment will exist only if hazards are discovered and corrected through *regular* and *frequent* inspections by school personnel—administrators, teachers and students. Safety inspections are to determine if everything is satisfactory.

Inspections may be made at the request of the board of education, the school administration or upon the initiative of the teacher. Some communities have drawn upon the cooperative service of professional safety engineers, inspectors of state labor departments, insurance companies and local safety councils to supplement and confirm inspections by school personnel.

The National Standard School Shop Safety Inspection Check List, recommended by the President's Conference on Industrial Safety is an objective inspection procedure for the school shop.

DIRECTIONS

WHO INSPECTS?

This will depend upon local policies. It is recommended, however, that shop teachers, and students—the student safety engineer and/or student safety committee—participate in making regular inspections. This not only tends to share responsibility but stimulates a broader interest in the maintenance of a safe school shop.

WHEN TO INSPECT?

As a minimum, a safety inspection should be made at the beginning of every school term or semester. More frequent inspections may be advisable.

HOW TO INSPECT?

Inspections should be well planned in advance.

Inspections should be systematic and thorough. No location that may contain a hazard should be overlooked.

Inspection reports should be clear and concise, but with sufficient explanation to make each recommendation for improvement understandable.

FOLLOW-UP

The current report should be compared with previous records to determine progress. The report should be studied in terms of the accident situation so that special attention can be given to those conditions and locations which are accident producers.

Each unsafe condition should be corrected as soon as possible in accordance with accepted local procedures.

A definite policy should be established in regard to taking materials and equipment out of service because of unsafe conditions.

The inspection report can be used to advantage as the subject for staff and class discussion.

CHECKING PROCEDURE

Draw a circle around the appropriate letter, using the following letter scheme:

S — Satisfactory (needs no attention)
A — Acceptable (needs some attention)
U — Unsatisfactory (needs immediate attention)

Recommendations should be made in all cases where a "U" is circled. Space is provided at the end of the form for such comments. Designate the items covered by the recommendations, using the code number applicable (as B-2).

In most categories, space is provided for listing of standards, requirements or regulations which have local application only.

A. GENERAL PHYSICAL CONDITION

1. Machines, benches, and other equipment are arranged so as to conform to good safety practices ..... S A U
2. Condition of stairways ..... S A U
3. Condition of aisles ..... S A U
4. Condition of floors ..... S A U
5. Condition of walls, windows, and ceiling ..... S A U
6. Illumination is safe, sufficient, and well placed ..... S A U
7. Ventilation is adequate and proper for conditions ..... S A U
8. Temperature control ..... S A U
9. Fire extinguishers are of proper type, adequately supplied, properly located and maintained ..... S A U
10. Teacher and pupils know location of and how to use proper type for various fires ..... S A U
11. Number and location of exits is adequate and properly identified ..... S A U
12. Proper procedures have been formulated for emptying the room of pupils and taking adequate precautions in case of emergencies S A U
13. Lockers are inspected regularly for cleanliness and fire hazards. S A U
14. Locker doors are kept closed ..... S A U
15. Walls are clear of objects that might fall ..... S A U
16. Utility lines are properly identified ..... S A U
17. Teachers know the procedure in the event of fire including notification of the fire department and the evacuation of the building. S A U
18. Air in shop is free from excessive dust, smoke, etc. .... S A U
19. _____ S A U
20. _____ S A U
21. _____ S A U
22. _____ S A U
23. Evaluation for the total rating of A. GENERAL PHYSICAL CONDITION ..... S A U

B. HOUSEKEEPING

1. General appearance as to orderliness..... S A U
2. Adequate and proper storage space for tools and materials. S A U
3. Benches are kept orderly..... S A U
4. Corners are clean and clear..... S A U
5. Special tool racks, in orderly condition, and provided at benches and machines..... S A U
6. Tool, supply, and/or material room is orderly..... S A U
7. Sufficient scrap boxes are provided..... S A U
8. Scrap stock is put in scrap boxes promptly..... S A U
9. Materials are stored in an orderly and safe condition.. S A U
10. A spring lid metal container is provided for waste and oily rags. S A U
11. All waste materials and oily rags are promptly placed in the containers..... S A U
12. Containers for oily rags and waste materials are frequently and regularly emptied..... S A U
13. Dangerous materials are stored in metal cabinets..... S A U
14. Machines have been color conditioned..... S A U
15. Safety cans are provided for flammable liquids..... S A U
16. Bulk storage of dangerous materials is provided outside of the main building..... S A U
17. A toe-board or railing around a mezzanine used for storage or washing facilities..... S A U
18. Materials are stored in an orderly and safe condition on this mezzanine..... S A U
19. Flammable liquids are not used for cleaning purposes S A U
20. Floors are free of oil, water and foreign material..... S A U
21. Floors, walls, windows, and ceilings are cleaned periodically. S A U
22. _____ S A U
23. _____ S A U
24. _____ S A U
25. _____ S A U
26. Evaluation for the total rating for B. HOUSEKEEPING S A U

C. EQUIPMENT

1. Machines are arranged so that workers are protected from hazards of other machines, passing students, etc..... S A U
2. Danger zones are properly indicated and guarded..... S A U
3. All gears, moving belts, etc., are protected by permanent enclosure guards..... S A U
4. All guards are used as much as possible..... S A U

C. EQUIPMENT (continued)

5. All equipment control switches are easily available to operator. S A U
6. All machines are "locked off" when instructor is out of the room. S A U
7. Brushes are used for cleaning equipment..... S A U
8. Nonskid areas are provided around machines..... S A U
9. Machines are in safe working condition..... S A U
10. Machines are guarded to comply with American Standards Association and local state code..... S A U
11. Adequate supervision is maintained when students are using machines and dangerous tools..... S A U
12. Tools are kept sharp, clean and in safe working order S A U
13. All hoisting devices are in safe operating condition... S A U
14. Machines are shut off while unattended..... S A U
15. Adequate storage facilities for tools, equipment, etc., not in immediate use..... S A U
16. _____ S A U
17. _____ S A U
18. _____ S A U
19. _____ S A U
20. Evaluation for the total rating for C. EQUIPMENT.. S A U

D. ELECTRICAL INSTALLATION

1. All switches are enclosed..... S A U
2. There is a master control switch for all of the electrical installations..... S A U
3. Electrical outlets and circuits are properly identified.. S A U
4. All electrical extension cords are in safe condition and are not carrying excessive loads..... S A U
5. All machine switches are within easy reach of the operators. S A U
6. Electrical motors and equipment are wired to comply with the National Electric Code..... S A U
7. Individual cut-off switches are provided for each machine. S A U
8. Machines are provided with overload and underload controls by magnetic pushbutton controls..... S A U
9. No temporary wiring in evidence..... S A U
10. _____ S A U
11. _____ S A U
12. _____ S A U
13. _____ S A U
14. Evaluation for the total rating for D. ELECTRICAL INSTALLATION..... S A U

E. GAS

1. Gas flow to appliances is regulated, so that when appliance valve is turned on full, the flames are not too high..... S A U

2. Gas appliances are properly insulated with asbestos or other insulating material from tables, benches, adjacent walls, or other flammable materials ..... S A U

3. No gas hose is used where pipe connections could be made. S A U

4. Gas appliances have been adjusted so that they may be lighted without undue hazard..... S A U

5. Students have been instructed when lighting gas appliances to light the match first before turning on the gas..... S A U

6. There are no gas leaks, nor is any odor of gas detectable in any part of the shop..... S A U

7. Shop instruction has been given concerning the lighting of gas furnaces operating with both air and gas under pressure.. S A U

8. When lighting the gas forge, goggles are worn..... S A U

9. When lighting the gas furnace, the following procedure is used: (a) light the match; (b) turn on the gas; (c) drop the match in the hole in top of the furnace..... S A U

10. In shutting down the gas furnace, the gas valve is closed before the air valve..... S A U

11. _____ S A U

12. _____ S A U

13. _____ S A U

14. _____ S A U

15. Evaluation for the total rating for E. GAS..... S A U

F. PERSONAL PROTECTION

1. Goggles or protective shields are provided and required for all work where eye hazards exist..... S A U

2. If individual goggles are not provided, hoods and goggles are properly disinfected before use..... S A U

3. Shields and goggles are provided for electric welding.. S A U

4. Rings and other jewelry are removed by pupils when working in the shop..... S A U

5. Proper kind of wearing apparel is worn and worn properly for the job being done..... S A U

6. Leggings, safety shoes, etc., are worn in special classes such as foundry, etc., when needed..... S A U

7. Respirators are provided for dusty or toxic atmospheric conditions such as when spraying in the finishing room..... S A U

8. Provisions are made for cleaning and sterilizing respirators. S A U

9. Students are examined for safety knowledge ability.. S A U

10. Sleeves are rolled above elbows when operating machines. S A U

11. Clothing of students is free from loose sleeves, flopping ties, loose coats, etc. ..... S A U

12. _____ S A U

F. PERSONAL PROTECTION (continued)

13. _____ S A U

14. _____ S A U

15. _____ S A U

16. Evaluation for the total rating for F. PERSONAL PROTECTION. S A U

G. INSTRUCTION

1. Shop Safety is taught as an integral part of each teaching unit. S A U

2. Safety rules are posted particularly at each danger station. S A U

3. Printed safety rules are given each student..... S A U

4. Pupils take a safety pledge..... S A U

5. Use of a safety inspector..... S A U

6. Use of a student shop safety committee..... S A U

7. Use of safety contests..... S A U

8. Motion and/or slide films on safety are used in the instruction. S A U

9. Use of suggestion box..... S A U

10. Use of safety tests..... S A U

11. Use of safety posters..... S A U

12. Talks on safety are given to the classes by industrial men. S A U

13. Tours are taken of industrial plants as a means of studying safety practices ..... S A U

14. Periodic safety inspections of the shop are made by a student committee ..... S A U

15. Men from industry make safety inspections of the shop S A U

16. Student shop safety committee investigates all accidents S A U

17. A proper record is kept of safety instructions which are given, preferably showing the signature of student on tests given in this area ..... S A U

18. Rotate students on the Shop Safety Committee so that as many students as possible have an opportunity to participate... S A U

19. _____ S A U

20. _____ S A U

21. _____ S A U

22. _____ S A U

23. Evaluation for the total rating of G. INSTRUCTION S A U

H. ACCIDENT RECORDS

1. There is a written statement outlining the proper procedure when and if a student is seriously hurt..... S A U

2. Adequate accident statistics are kept..... S A U

3. Accidents are reported to the proper admini trative authority by the instructor ..... S A U

H. ACCIDENT RECORD (continued)

4. A copy of each accident report is filed with the State Department of Education ..... S A U

5. Accident reports are analyzed for instructional purposes and to furnish the basis for elimination of hazards..... S A U

6. _____ S A U

7. _____ S A U

8. _____ S A U

9. _____ S A U

10. Evaluation for the total rating of H. ACCIDENT RECORDS. S A U

I. FIRST AID

1. An adequately stocked first aid cabinet is provided... S A U

2. The first aid is administered by a qualified individual S A U

3. The school has individuals qualified to administer first aid. S A U

4. _____ S A U

5. _____ S A U

6. _____ S A U

7. _____ S A U

8. Evaluation for the total rating of I. FIRST AID.... S A U

RECOMMENDATIONS

Code No.	

For additional copies in packets of 50 send $1.00 to National Safety Council, 425 North Michigan Avenue, Chicago, Ill. 60611

UNIT VII

EMERGENCY ACTION

Emergency situations can arise anywhere in the school environemnt. Procedures for dealing with these events should be developed and approved by the institution prior to the start of the school year. These procedures should be reviewed and revised periodically to determine their effectiveness and to make necessary modifications. The following will guide the individual school officials in developing their own emergency procedures.

BE PREPARED. Think through what you will do in the event of injury before the emergency occurs. Discuss emergency procedures with your department head, director or principal. Arrange communications, first aid, transportation, and other details before an accident occurs.

Emergency Communications

Procedures established for emergency situations and accidents must meet an approved method of "who tells what to whom and when." To facilitate this communication, it is desirable that each industrial arts/trade and industry room have a telephone with a direct outside line (for ambulance, fire and police emergencies). In addition:

1. All students should know the location of the telephone and be familiar with the emergency procedures and numbers.

2. All personnel in the laboratory should have access to the telephone for emergency communications. The telephone should not be locked in the teacher's office.

3. Emergency procedures and police, ambulance, and fire department numbers, and the procedure for dialing an outside line should be posted at each telephone location.

Communicating Safety to Parents

For years, industrial arts and vocational/technical instructors have sent home permission slips to be signed by the parent or guardian allowing his/her child to participate in the shop program. Many teachers believed this permission slip relieved them of at least some, if not all of their responsibility and liability, should an accident occur. IT DOES NEITHER OF THESE. The purpose of this type of communication is to:

1. Inform the parent of the student's participation in shop-type activities.

2. Outline the safety instruction and procedures that are followed by the teacher and the institution or system.

3. Obtain from the parent relevant information regarding any health problems that may have a bearing on the student's performance.

4. List the parent's /guardian's name(s) and telephone number(s) where they can be reached during school hours and list the name of the family doctor.

When an Injury Occurs

There are two aspects of emergency procedures:

1. What must be done immediately following the injury.

2. What must be done after the confusion has subsided and the injured party is treated.

Primary Concerns

Primary concerns are directly related to the injured person and the reduction of hazard to that person. The degree of emergency care is dependent on the injury and the qualifications of the person administering the care. If the instructor is not qualified in first aid, he/she must do only those things that will assure no further damage to the injured person and immediately seek trained help. Action might be limited to stopping the bleeding or covering a person in shock with a blanket. Although every teacher should be trained in basic emergency first aid, many are not. Serious damage to the injured can sometimes result when treated by an untrained, panicked teacher. The following basic steps are recommended when an injury occurs:

1. Determine the extent and type of injury. If this is not possible, immediately get professional help.

2. Restore breathing, restore the heart and stop the bleeding, if trained to do so. If not, send for help.

3. Apply only the first aid that is necessary to preserve life. Do no more until trained help arrives.

4. Disperse the crowd and keep the injured and the surrounding area as quiet as possible.

5. Send a student to notify the school nurse, principal/director and immediate supervisor. Do not leave the injured alone.

6. If the injury is minor (e.g., splinter, slight cut), send the student to the school nurse accompanied by another student. Do not send the injured student alone.

7. If a foreign particle has entered the eye, seek professional help. A teacher should never try to remove anything from a student's eye. If a liquid has entered the eye (acid, for example), immediately wash the eye in an eye wash and contact the nurse.

8. Notify parents and school officials.

It is the responsibility of the instructor to know what to do in case of an accident and also to know what not to do. The Red Cross and other agencies offer a variety of helpful courses. The first few minutes—even seconds—of a pupil's injury are sometimes th most critical, and the action or inaction of the industrial arts/vocational education instructor could be crucial to the student's life.

Secondary Concerns

When the injured student has been treated by professional or paraprofessional help (a nurse, an ambulance crew or a doctor), the concerns of the teacher move to the remaining students and the follow-up procedures regarding the injury. Such action as the following is necessary:

1. Calm the other members of the class and restore a safe environment. If the accident was serious, discontinue instruction for the period. The students will be too upset to perform effectively and may, in fact, be "accident prone."

2. Complete the accident report, as required. (This report must be retained until five years after the injured student leaves your school, or if the pupil is a special education student, it must be retained permanently.)

3. Analyze the cause and the effect of the accident and make written recommendations to the principal/director for corrective measures to be taken. (Retain a copy of this communication and subsequent action.)

4. Review and record the safety practices, procedures, instruction, and student evaluation concerning the cognitive, psychomotor, and affective instruction that was delivered and was intended to prevent this type of accident.

5. Check on the results of the treatment of the injured pupil.

6. Follow up in your classes with a discussion and instruction regarding the safe practices that were violated, thus contributing to the accident.

These procedures should also be followed for "near accidents" to assure that the casual conditions are treated and eliminated from the laboratory environment.

In schools where nurses are in attendance, it is preferable that they be delegated the responsibility for first aid because of their specialized training and experience. However, even if a nurse is available in the school, teachers should be qualified in first aid so that precious minutes can be saved in an emergency. Delay in caring for even small cuts and scratches can also have serious results.

The practice of permitting a student to care for his/her own injuries must be discouraged. The teacher should be informed about every classroom injury. Likewise, indiscriminate use of the first aid kit by students must be discouraged. It should be used only under supervision. The limitations of first aid must be thoroughly understood, and it is important that the teacher or one appointed by him/her to look after the school shop first aid work, have a full understanding of these limitations.

FIRST AID KIT

An important part of being prepared for an emergency is to have a well-stocked first aid kit. The kit should be kept in a location where every student can find it, marked with a green cross large enough to be visible from any area of the shop. The items listed below should be included:

First Aid Supplies	Other Useful Items
Band-aids	Thermometers
Gauze pads	Eye cup and dropper
Sterile pads	Blunt tipped scissors
Bandages	Tweezers
Tape	Wooden tongue depressors
Adhesive bandages	Safety pins
Cleansing wipes	Heating pad
Ammonia inhalents	Ice bag or instant cold pack
Rubbing alcohol	Talcum powder
Eye pads	Finger splints
Eye irrigating solution	Wire splint
Cotton buds	Tourniquet
Elastic bandage	

Inspect the kit periodically to determine both the condition and the amount of supplies.

FIRST AID PROCEDURES FOR SPECIFIC INJURIES

Bleeding

There are several types of bleeding and each indicates different things. When blood spurts, it is arterial bleeding, indicating severing of an artery. When blood flows, it indicates a vein has been cut, and when blood oozes, it indicates it should be stopped immediately. This can be accomplished by using one of the following methods:

1. Direct Pressure. Place a pad of clean material (preferably sterile gauze) over the wound and hold in place with firm pressure until a pressure bandage can be applied. If necessary, use your bare hand or fingers until a compress can be applied.

2. Finger or Hand Pressure. When blood is spurting and cannot be controlled by direct pressure, place a finger or hand on a pressure point to slow the flow of blood. Pressure on a femoral artery in the mid-groin against the pelvic bone will lessen bleeding in lower extremities below the pressure point. Finger pressure on the trachial artery will lessen the flow of blood to upper extremeties. A tourniquet should only be used as a last resort. A tourniquet can be made by tying a handkerchief, cloth, belt strap or necktie around the bleeding extremity between the body and the wound. Use a small stick, pencil or similar article to twist and tighten. Twist only hard enough to stop the bleeding. Loosen it every twenty minutes to let a little blood escape. Keep the parts elevated.

Breaks or Fractures

There are two kinds of fractures: (1) simple fractures where a bone is broken, but the skin is not; and (2) compound fractures where both the bone and skin are broken. When a compound fracture has occurred, the danger of infection is great and especially serious damage can be done by careless handling. Generally, the following procedures should be followed:

1. Try not to move the victim before medical help arrives. Never try to push a broken bone into place.

2. For a simple fracture, put the limb in as natural a position as possible without hurting the victim.

3. Keep the victim warm and quiet.

5. If you must move the victim, do not do so until the broken bone has been placed in a splint. You can make a splint from any rigid object. It must be long enough to extend beyond the joints nearest the fracture. Put some kind of padding between the surface of the splint and the limb. Tie the splint in place above the upper joint, over the break, and below the lower joint.

6. If the victim of a broken back or neck must be moved because of a dangerous situation, use a stretcher. You can improvise a stretcher by buttoning two shirts or a coat around two branches or poles. Carry the victim with a broken neck face up and victim with a broken back face down.

Open Wounds

Any break in the skin is an open wound, with some being more serious than others.

Minor cuts and abrasions: Wash thoroughly with soap and warm water. Cover with a sterile gauze pad or compress bandage.

Serious wounds: For deep cuts or wounds, cover the wound and area around it with sterile gauze pad (or other clean material) and bandage securely. If bleeding does not stop, control by direct pressure or finger or hand pressure.

Puncture wounds: Wash with soap and water and bandage. Control the bleeding, if present, and take the victim to a doctor.

Convulsions

1. Give the victim plenty of room. Do not attempt to restrain him/her.

2. If possible, place the victim on his back and loosen clothing around the neck.

3. Put a cloth pad, or a cloth-wrapped stick between the victim's teeth to prevent biting of the tongue or mouth.

Shock

Lay the victim flat on the back with head low, unless head is bleeding. Remove false teeth, gum or tobacco from mouth. Keep the victim warm. If the victim is not unconscious or bleeding, give a stimulant such as ammonia, hot coffee, tea or water.

Mouth to Mouth Breathing

1. Start immediately and call a doctor. If gas or smoke is present, first move the victim to fresh air. If an electric shock has occurred, make sure the body is not in contact with energized items before touching it.

2. Remove any foreign matter from the victim's mouth.

3. Tilt the victim's head back with the victim on his/her back, neck extended. Grasp lower jaw and lift forcefully upward into a jutting-out position.

4. If the air passage is not cleared, strike sharp blows between the victim's shoulder blades.

5. Open your mouth wide, cover the victim's mouth completely, air-tight and close the victim's nose by pinching.

6. Blow air into the vicitm's lungs until the chest rises (less forcefully for children). Remove the mouth to allow the victim to exhale. If the chest does not rise, check for correct positioning and removal of foreigh matter. The tongue may be blocking the air passage.

7. Repeat (12 times a minute for adults, 20 for children) until the victim revives. Do not stop!

Choking

1. If the victim is an infant, holk him/her by the ankles, head down, and slap the victim between the shoulder blades to let any obstruction fall out.

2. Hold a small child over an arm or leg and hit between the shoulder baldes.

3. Either bend an adult over a chair, or lay the adult on his/her side, and hit the individual between the shoulder blades.

4. In all cases, if the object is not dislodged, pull the tongue forward and sweep the throat area with your fingers.

5. If the victim has trouble breathing, start mouth to mouth artificial respiration.

6. If choking stops, but the foreign object has not been dislodged, consult a doctor.

With Any Serious Injury or Illness

1. Move the victim only when there is an immediate threat of further injury if not moved.

2. Stay calm.

3. If mouth to mouth artificial respiration is needed, start it immediately.

4. If bleeding is present, control it.

5. Treat for shock.

6. Keep the victim lying down and quiet.

7. Dress all wounds and burns.

8. Support all fractures on both sides of fracture area and supply well-padded splints.

9. Notify the police or other authorities so the victim can be transported to a hospital or a doctor as carefully and quickly as possible.

Electrical Shock

A person may receive an electrical shock by touching a faulty electrical tool or appliance, a bare wire, or an exposed socket. Shock hazards also exist inside various types of electronic equipment and around power lines. The possibility of shock is greatly increased if the person is also in contact with a grounded surface, or if the floor or his/her body is damp.

1. If possible, shut off the current quickly.

2. If the current cannot be shut off promptly, attempt to move the victim away from the conductor, using some sort of insulated material.

3. Do not touch the victim until all electrical contact is broken. Use a wooden pole, such as a broom handle, to separate the victim and the conductor. A large cloth, such as a coat, may also be used.

4. A live conductor may cling to the victim, making it necessary to pull him or her (or the conductor) quite a distance away.

5. If the victim is not breathing after he/she has been removed from contact with the conductor, give him artificial respiration.

Chemical Burns

Wash away the chemical completely with large quantities of running water. After removing the chemical, apply a burn dressing. Obtain medical help promptly.

GENERAL DIRECTIONS FOR GIVING FIRST AID

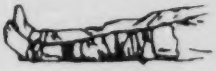
Courtesy American National Red Cross

KEEP THE INJURED PERSON LYING DOWN DO NOT GIVE

LIQUIDS TO THE UNCONSCIOUS CONTROL BLEEDING BY PRESSING ON

THE WOUND RESTART BREATHING WITH MOUTH-TO-MOUTH ARTIFICIAL

RESPIRATION DILUTE SWALLOWED POISONS KEEP BROKEN BONES

FROM MOVING  COVER BURNS WITH THICK LAYERS OF

CLOTH KEEP HEART-ATTACK CASES QUIET

FAINTING: KEEP HEAD LOWER THAN HEART COVER EYE INJURIES WITH

GAUZE PAD

ALWAYS CALL A DOCTOR

TAKE A RED CROSS FIRST AID COURSE

THE AMERICAN NATIONAL RED CROSS

SAVING A LIFE

BY ARTIFICIAL RESPIRATION

THE AMERICAN NATIONAL RED CROSS

If victim is not breathing, begin some form of artificial respiration at once. Wipe out quickly any foreign matter visible in the mouth, using your fingers or a cloth wrapped around your fingers.

MOUTH-TO-MOUTH (MOUTH-TO-NOSE) METHOD

Tilt victim's head back. (Fig. 1). Pull or push the jaw into a jutting-out position. (Fig. 2).

If victim is a small child, place your mouth tightly over his mouth and nose and blow gently into his lungs about 20 times a minute. If victim is an adult (see Fig. 3), cover the mouth with your mouth, pinch his nostrils shut, and blow vigorously about 12 times a minute.

If unable to get air into lungs of victim, and if head and jaw positions are correct, suspect foreign matter in throat. To remove it, suspend a small child momentarily by the ankles or place child in position shown in Fig. 4, and slap sharply between shoulder blades.

If the victim is adult, place in position shown in Fig. 5, and use same procedure.

Courtesy American National Red Cross

53

PLANNING FOR OTHER EMERGENCIES

Specific plans and evacuation procedures to follow in the event of such emergencies as fire, bomb threat, train derailment, and natural disasters (hurricane, tornado, flood, etc.), which would probably require prompt clearing of the building, should be discussed with students at the very beginning of the school year. Every student should know exactly what to do in the event of an alarm of any kind, and each student should be aware of his/her responsibility in helping the emergency procedures move smoothly. Proper knowledge and training are the best possible ways to avoid panic situations which might end in tragedy.

An evacuation chart sketching the best possible escape route should be prominently displayed in every room. Periodic evacuation drills should be held, and every student should be required to participate. In addition, every student should know the location of the alarm system so that he/she can raise the alert should he/she discover the emergency situation. The signal or alarm that would signify an emergency should be discussed and understood by all.

The instructor should pay special attention to how quickly his or her department is evacuated when a drill is conducted. The instructor should also use the opportunity to note special problems and areas where the plan is inadequate, so that he/she could take steps to correct problems before an actual emergency occurs.

Each instructor must be responsible for the shut-down of all equipment. Sometimes, it is wise to assign students to shut down any equipment with which they are working at the time of the alarm. Some instructors prefer to handle this themselves. Switch-off of power to machines and master controls of gas systems as well as closing ventilators and heaters should also be considered. See that whoever is responsible has quick, easy access to any necessary keys, and knows the exact location of all shut-off valves and switches.

Periodic checks should be made to assure that the designated exit routes are clean and unblocked by locked doors, clutter, or stored materials. Alternate routes should also be inspected.

FIRE

Total fire prevention, protection, and control, and control programs involve four basic requirements:

1. The prevention of the outbreak of fire.
2. The prevention of the spread of fire.
3. The prompt detection and extinguishment of fire.
4. The provision of suitable exits and the prevention of panic.

Prevention

Because of the nature of equipment and materials in vocational education and industrial arts laboratories, the threat of fire is greater than in other classrooms. The best action for fire is preventive action. Four conditions must be present simultaneously for a fire to start and burn.

1. Oxygen must be present. Air usually contains between 16 to 21 percent of oxygen, with the average flame starting to extinguish below 16 percent oxygen. In some cases, the oxygen is incorporated directly into a chemical and air is not necessary for burning to occur.

2. There must be a supply of fuel: Any combustible material such as wood, paper, oils, etc.

3. The temperature of the fuel must be above the ignition point. Ignition temperatures vary—wood, 469 to 514° F; newsprint paper, 451° F; pyroxylin plastic, 275° F; and cotton (duck), 439° F.

4. A flame chain reaction exists. Fuel molecules appear to combine with oxygen in a series of successive intermediate stages, called branched-chain reactions, in arriving at the final end products of combustion. These intermediate stages are responsible for the evolution of flames.

Elimination of any one of those conditions will prevent or stop a fire. There are numerous sources for the combination of these four conditions in a school shop. Therefore, special emphasis should be placed on the following to promote prevention.

Gas

Gas is used extensively in school shops as the fuel for brazing, heat treating, soldering and melting furnaces, and for other purposes. Gas equipment may leak or gas may escape because of faulty ignition in the appliance. Frequent inspection and the use of safety pilots and cut-off valves is essential where gas is in use. Special instruction must be given to students before they are permitted to light gas-fired torches or appliances.

Housekeeping

Housekeeping is inseparable from fire protection. Flammable and combustible materials need to be stored in the proper place and manner. Rubbish must not be allowed to accumulate on floors, in corners, or other niches. Waste material should be removed daily. Oil accumulation on floors, oil-soaked wood or porous floors may ignite if contacted by flame, sparks, or sufficient heat.

Electrical Equipment

Electrical devices and equipment which are improperly installed, worn, old, or poorly maintained, may precipitate a fire. Short circuits causing arcing and heating sufficient to ignite flammable materials, an accumulation of oil or grease around motors, and the breakdown of insulation around old wiring are common causes of short circuits. Other causes may be found in the use of improper wire size, fuses too large for wire capacity, extension cords improperly used or maintained, and poor connections in the wiring.

Matches and Smoking

Common causes of fire in industrial plants which should be controlled in the school situation are matches and smoking. Smoking should be no problem in most school shops, since students are usually not allowed this privilege. However, it is known that custodians, teachers, and visitors sometimes smoke in shops during "off" hours. Of course, this should be prohibited. Matches present a different problem because they are used and carried by students. Only safety matches should be allowed in the shop, and whenever torches are to be lit, the safety, flint, or scratch type of lighter should always be used.

Spontaneous Ignition

This form of ignition perhaps has been more common in school shops than in industry, attributable partially to the lack of understanding by students and to the fact that combustibles are often left in one location for considerable lengths of time (i.e., over weekends and holidays). Oily or paint-soaked rags and clothing left in student lockers are probably the greatest hazard. Other sources contributing to this hazard are rubbish and the accumulation of dust, lint, and oil in duct work and flues. Safety metal containers with a self-closing lid must be used for the storage of oily or paint-filled waste and rags.

Open Flames

This is an obvious hazard which accompanies the performance of welding, soldering, forging, forming, and other heating operations. Fireproof materials, such as steel plates and asbestos sheets, should be installed around permanent equipment. The greatest hazards are present when portable equipment, such as gas welders, blow torches, bunsen burners, plumber's furnaces and soldering torches, are in use. Students must be given thorough instruction in the operation and care of such equipment. Open flames should not be left unattended. The immediate area where they are to be used should be cleared of flammable or combustible material, and the operator must use care in directing the flame in order to prevent burns to himself, others, and adjacent material. Appropriate clothing should be worn in these types of operations.

Heated Surfaces

Heated surfaces are found on furnaces, flues, glue pots, hot plates, hot metals, and regular or infra-red light bulbs. These heated surfaces will cause fires if flammable or combustible materials are close enough to absorb heat sufficient to raise them to the ignition point. Building codes prescribe the minimum clearance between such surfaces and adjacent combustible materials. Surrounding areas should be kept clear of flammable material, and walls, bench tops, and ceilings near such surfaces should be covered with nonflammable materials. Occasionally a heated surface will develop from friction caused by slipping belts, hot bearings, or moving parts rubbing against guards, floors, or other stationary objects. The presence of oil, grease, or rubbish near these areas may result in a fire.

Molten Metal

Hot, molten metal from welding and foundry operations must be controlled through the use of proper handling equipment in areas constructed from fireproof material. Nonflammable personal protective clothing is required for students working in these areas. The danger from flying globules of molten metal or of spilling molten metals is ever present with these operations, and if molten metals come into contact with flammable material, ignition will result.

Volatile Liquids

Such liquids include paint, varnish, lacquer, sealers, finishing materials, cleaners, solvents, and other petroleum products. They are frequent sources of fires, caused by vapors resulting from the rapid evaporation of the liquids. The liquid itself does not burn, but heat causes vaporization, which may be ignited by sparks from nearby heated metals, sparks from metallic objects striking together, electrical spark from light switches, static electricity, or any open flame. Vapors are generally heavier than air and may travel along the floor a considerable distance before they are ignited and flash back to the sources. Tight metal containers, properly color-coded, labeled, and kept in metal cabinets, are a requirement for storage. Fire prevention codes usually specify that no more than five gallons of such liquids may be stored inside the work area. Approved metal safety cans having an antiflash screen or flame arrester in the spout should be used.

CLASSIFICATION OF FIRES

Four general classifications of fires based on the types of extinguishing media necessary to combat each have been adopted by the National Fire Protection Association.

Class A Fires

Class A fires are those which occur in ordinary material, such as wood, paper excelsior, rags, and rubbish. The quenching and cooling effects of water or of solutions containing large percentages of water are of first importance in extinguishing these fires. Special dry chemical agents (multi-purpose dry chemical) provide a rapid knockdown of the flames and the formation of a coating which tends to retard further combustions.

Class B Fires

Class B fires are those which occur in the vapor-air mixture over the surface of flammable liquids such as gasoline, oil, grease, paints, and thinners. The limiting of air (oxygen), or the combustion-inhibiting effect, is of primary importance in fires of this class. Solid streams of water are likely to spread the fire. Under certain circumstances water fog nozzles prove effective. Generally, regular dry chemical, multi-purpose dry chemical, or carbon dioxide foam are used, depending on the circumstances of the fire.

Class C Fires

Fires that occur in or near electrical equipment where nonconducting extinguishing agents must be used are called Class C fires. Dry chemical, carbon dioxide, or compressed gas extinguishing agents are suitable. Foam or a stream of water are good conductors and can expose the operator to a severe shock hazard and therefore should not be used. Water from a very fine spray can sometimes be used on fires and electrical equipment, as in transformers. A spray is not as good an electrical conductor as a stream of water is; therefore it is safer to use in such cases. In any event, only an extinguisher designated for Class C fires should be used.

Class D Fires

Fires that occur in combustible metals such as magnesium titanium, zirconium, lithium, and sodium are classified under Class D. Specialized techniques, extinguishing agents, and extinguishing equipment have been developed to control and extinguish fires of this type. Normal extinguishing agents generally should not be used on metal fires, as there is a danger in most cases of increasing the intensity of the fire because of chemical reactions between extinguishing agents and the burning metal.

Extinguishment

Fire extinguishers should be located in several areas throughout the shop. The regular inspection and testing of fire extinguishers should be conducted to ascertain whether they are in proper working condition.

and fully charged. The area around the extinguishers should be marked with green and kept clear to facilitate ease of location and accessibility. Students should be instructed in the location and use of fire extinguishers and other fire-fighting equipment.

Each fire extinguisher bears a letter (which usually has a metallic or green background) which indicates what class fire the extinguisher will successfully put out. Water type extinguishers, which are effective for Class A fires, can be of several kinds: stored pressure, cartridge operated, water pump tank, and soda acid.

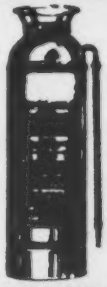
Foam extinguishers are successful for Class A and B fires, while carbon dioxide and sodium and potassium bicarbonate dry chemical extinguishers are effective for only Class B and C fires. Multipurpose ABC dry chemical extinguishers, in either stored pressure or cartridge operated types, work for A, B, or C class fires. Class D fires should only be fought with special extinguishing agents approved by recognized testing laboratories (see chart on page 60 and 60A).

If clothing should catch on fire, avoid panic. The flames should be smothered by wrapping in a blanket or coat, or by rolling on the floor or ground.

Fire Prevention

1. Do not overload electrical circuits.
2. Do not use frayed or defective electrical cords.
3. Do not allow any electrical repairs to be made by the students unless they are supervised by the instructor.
4. Do not use gasoline for anything except to run an engine.
5. Do not prime the engine with gasoline while running.
6. Do not weld near gas tanks, fuel lines, or any combustible materials.
7. Retain gasoline and store it in a safety can only.
8. If a fire should occur, use the proper extinguishers: (see chart on pp.60 & 60A)
   A. Carbon dioxide: all electrical equipment
   B. Foam: oils, gasoline, grease, or paint
   C. Soda-acid: wood, cloth, paper or rubbish
   D. Vaporizing liquids: general purpose
9. If a fire cannot be readily extinguished, keep calm and evacuate the shop immediately and turn in an alarm.

KNOW YOUR FIRE EXTINGUISHERS

	WATER TYPE			
	STORED PRESSURE	CARTRIDGE OPERATED	WATER PUMP TANK	 SODA ACID
CLASS A FIRES — ORDINARY COMBUSTIBLES — WOOD, PAPER, TRASH HAVING GLOWING EMBERS	YES	YES	YES	YES
CLASS B FIRES — FLAMMABLE LIQUIDS — FLAMMABLE LIQUIDS, GASOLINE, OIL, PAINTS, GREASE, ETC.	NO	NO	NO	NO
CLASS C FIRES — ELECTRICAL EQUIPMENT — ELECTRICAL EQUIPMENT	NO	NO	NO	NO
CLASS D FIRES — COMBUSTIBLE METALS — COMBUSTIBLE METALS	SPECIAL EXTINGUISHING AGENTS APPROVED BY RECOGNIZED TESTING LABORATORIES			
METHOD OF OPERATION	PULL PIN-SQUEEZE HANDLE	TURN UPSIDE DOWN AND BUMP	PUMP HANDLE	TURN UPSIDE DOWN
RANGE	30' - 40'	30' - 40'	30' - 40'	30' - 40'
MAINTENANCE	CHECK AIR PRESSURE GAUGE MONTHLY	WEIGH GAS CARTRIDGE ADD WATER IF REQUIRED ANNUALLY	DISCHARGE AND FILL WITH WATER ANNUALLY	DISCHARGE ANNUALLY -RECHARGE

KNOW YOUR FIRE EXTINGUISHERS

FOAM	CARBON DIOXIDE	DRY CHEMICAL			
		SODIUM OR POTASSIUM BICARBONATE		MULTI-PURPOSE ABC	
FOAM	CO 2	CARTRIDGE OPERATED	STORED PRESSURE	STORED PRESSURE	CARTRIDGE OPERATED
YES	NO (BUT WILL CONTROL SMALL SURFACE FIRES)	NO (BUT WILL CONTROL SMALL SURFACE FIRES)	NO (BUT WILL CONTROL SMALL SURFACE FIRES)	YES	YES
YES	YES	YES	YES	YES	YES
NO	YES	YES	YES	YES	YES
SPECIAL EXTINGUISHING AGENTS APPROVED BY RECOGNIZED TESTING LABORATORIES					
TURN UPSIDE DOWN	PULL PIN - SQUEEZE LEVER	RUPTURE CARTRIDGE - SQUEEZE LEVER	PULL PIN - SQUEEZE HANDLE	PULL PIN - SQUEEZE HANDLE	RUPTURE CARTRIDGE - SQUEEZE LEVER
30' - 40'	3' - 8'	5' - 20'	5' - 20'	5' - 20'	5' - 20'
DISCHARGE ANNUALLY -RECHARGE	WEIGH SEMI-ANNUALLY	WEIGH GAS CARTRIDGE - CHECK CONDITION OF DRY CHEMICAL ANNUALLY	CHECK PRESSURE GAUGE AND CONDITION OF DRY CHEMICAL ANNUALLY	CHECK PRESSURE GAUGE AND CONDITION OF DRY CHEMICAL ANNUALLY	WEIGH GAS CARTRIDGE - CHECK CONDITION OF DRY CHEMICAL ANNUALLY

10. Do not allow smoking in the shop at any time.

11. Disconnect batteries when working on or near the electrical system.

12. Disconnect the battery charger when connecting or removing cables from the battery.

13. Keep all fire away from charging batteries.

14. Do not run over extension or drop cords with jacks or creepers.

Safety Instructions for Use, Storage and Disposal of Flammable Liquids

1. Store flammable liquids in a fireproof room or cabinet.

2. Bring into the shop only sufficient flammable liquid for immediate use. Keep only a safety container approved by the Underwriters' Laboratory. Label the container with the name of the contents.

3. Use only approved cleaning solutions.

4. Avoid contact of carbon-removing or paint-stripping compounds with your skin.

5. Place rags containing oil, gasoline, paint, solvents, and other combustibles in designated (approved) metal containers.

6. Keep the top of oil drums and the surrounding area clean and free of combustible materials.

7. Dispose of unwanted flammable liquids and combustible materials daily.

ACCIDENT INVESTIGATION AND ANALYSIS

There is always a cause for any accident which occurs in a vocational education or industrial arts laboratory. Investigations should be conducted after any accident to determine the cause, if possible. Such studies are invaluable contributions toward prevention of future accidents, since that is the only way to apply corrective action.

The following steps are suggested for a successful investigation:

1. Go to the scene of the accident promptly.

2. Talk with the injured person and/or witnesses to get the facts.

3. Listen for clues in the conversation as to the possible causes of the accident.

4. Encourage the discussion of ideas for corrective action.

5. Study the possible causes.

6. Write a complete report, using whatever accident form has been adopted by your institution.

7. Follow up to make sure all of the causes are corrected.

8. Publicize corrective action on all bulletin boards so that all may benefit.

UNIT VIII

SAFETY RECORDKEEPING

One of the primary reasons for keeping health and safety records is to focus attention on problem areas so that corrective measures can be taken. The evaluation of accidents that have occurred, using a specific form like the one presented in this section, requires that the instructor look for causes and make plans to correct any problems which may be present. Good safety recordkeeping in this area also provides a basis for evaluating the safety program in use and initiating needed changes in procedures or facilities.

Safety records may also help to protect the instructor and the institution in the event of lawsuits. Although parental permission forms, safety tests, and safety instruction records do not provide a complete defense against such actions, they do tend to show the instructor was acting in "good faith" and may be construed as a partial defense in some courts.

Sample record forms, both a school's records and an instructor's records, are presented at the end of this unit. They may be reproduced or modified to fit the needs of a particular teacher or institution. The purpose or use of these forms is outlined below. Also included are copies of OSHA forms #100, #101, and #102, required of businesses and institutions that are under OSHA provisions.

School Records

I. Accident Forms

A. Accident reports should be made out as soon as possible after an accident has occurred. Copies of the reports should be retained in the instructor's file. Additional copies should be filed in the appropriate administrative offices.

B. A variety of accident report forms are available; however, they should all contain the following information when completed.

1. What was the nature of the accident? What were the circumstances leading up to the accident? What was the nature of the injuries or damage? What were the persons involved doing? What unsafe act or acts were committed? What were the direct or indirect causes? What machine, tool, substance, or object was most closely connected with the accident? What corrective action is indicated?

2. Who was injured or nearly injured? Who were the participants in the accident? Who committed the unsafe act? Who were the witnesses? Who administered first aid to the injured? Who completed the accident report?

3. Where did the accident occur? Where was the instructor at the time of the accident? Where was the injured person with respect to the machine, tool, substance, object, or person most closely associated with the accident?

4. When did the accident occur? When was the accident investigation made? When was the accident report completed?

5. Why was the unsafe act or hazardous condition permitted? Why did the person act unsafely? Why did the accident occur?

6. How did the accident happen? How did the physical environment contribute to the accident? How can similar future accidents be prevented?[1]

II. Records of Safety Committee Meetings

Each institution's safety committee should meet periodically to discuss the safety program being used and to review recommendations for improving the program.

III. Safety Inspection Records

Records of every inspection conducted in the vocational education and industrial arts laboratory should be filed by the institution. (See form on page 70.)

IV. School-Wide Safety Efforts and Programs

Information detailing the program in use in the school should be on file in the main office.

Teacher Records

I. Safety Instruction Records

Records of safety inspections, schedules of safety talks, and signed sheets acknowledging safety instruction should be kept by the instructor.

[1]William A. Williams, Accident Prevention Manual for Shop Teachers, (American Technical Society, Chicago, 1963), pp. 387-388.

II. Parental Permission/Consent Forms

Written parental permission should be obtained before minor students are permitted to use tools and operate equipment in industrial education laboratories. The purpose of this permission is to emphasize that safety is a cooperative effort, and to impress upon both students and parents that there is a certain degree of danger involved in the use of tools and equipment. It also offers the parent the option to prohibit the student's use of tools or equipment, if so desired.

III. Safety Tests

Instructors should administer appropriate safety tests to students before allowing them to use tools or equipment which could cause injury. The completed tests should be filed for reference. In addition to the test, a "statement of acknowledgment" should be filed with the safety test.

IV. Hazardous Conditions Reports

Any potential health or safety hazard should be reported in writing. Reports should be kept on file, noting the action that has been taken to alleviate the hazardous condition.

OSHA Records

Records required by the Federal Occupational Safety and Health Act are included here to provide administrators and instructors a guide for some other types of records.

I. Form #100—Log of Occupational Injuries and Illnesses

II. Form #101—Supplementary Record of Occupational Injuries and Illnesses

III. Form #102—Summary of Occupational Injuries and Illnesses for Calendar Year

STANDARD STUDENT ACCIDENT REPORT FORM
Part A. Information on ALL Accidents

1. Name: _____ Home Address: _____

2. School: _____ Sex: M☐ F☐ Age ___ Grade or classification: ___

3. Time accident occurred: Hour _____ A.M.; _____ P.M. Date: _____

4. Place of Accident: School Building☐ School Grounds☐ To or from School☐
Home☐ Elsewhere☐

5. NATURE OF INJURY

Abrasion	___	Fracture	___
Amputation	___	Laceration	___
Asphyxiation	___	Poisoning	___
Bite	___	Puncture	___
Bruise	___	Scalds	___
Burn	___	Scratches	___
Concussion	___	Shock (el.)	___
Cut	___	Sprain	___
Dislocation	___		
Other (specify)	___		

PART OF BODY INJURED

Abdomen	___	Foot	___
Ankle	___	Hand	___
Arm	___	Head	___
Back	___	Knee	___
Chest	___	Leg	___
Ear	___	Mouth	___
Elbow	___	Nose	___
Eye	___	Scalp	___
Face	___	Tooth	___
Finger	___	Wrist	___
Other (specify)	___		

DESCRIPTION OF THE ACCIDENT

How did accident happen? What was student doing? Where was student? List specifically unsafe acts and unsafe conditions existing. Specify any tool, machine or equipment involved.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

6. Degree of Injury: Death☐ Permanent Impairment☐ Temporary Disability☐ Nondisabling☐

7. Total number of days lost from school: ____ (To be filled in when student returns to school)

Part B. Additional Information on School Jurisdiction Accidents

8. Teacher in charge when accident occurred (enter name): _____
Present at scene of accident: No: ____ Yes: ____

9. IMMEDIATE ACTION TAKEN:

First-aid treatment ____ By (name): _____
Sent to school nurse ____ By (name): _____
Sent home ____ By (name): _____
Sent to physician ____ By (name): _____
Physician's Name: _____
Sent to hospital ____ By (name): _____
Name of Hospital: _____

10. Was a parent or other individual notified? No___ Yes___ When _____ How: _____
Name of parent notified: _____
By whom? (enter name): _____

11. Witnesses: 1. Name: _____ Address: _____
2. Name: _____ Address: _____

12. LOCATION

	Specify Activity		Specify Activity
Athletic field	_____	Locker	_____
Auditorium	_____	Pool	_____
Cafeteria	_____	Sch. grounds	_____
Classroom	_____	_____ shop	_____
Corridor	_____	Showers	_____
Dressing room	_____	Stairs	_____
Gymnasium	_____	Toilets & washrooms	_____
Home Econ.	_____	Other (specify)	_____
Laboratories	_____		

Remarks
What recommendations do you have for preventing other accidents of this type?

Signed: Principal _____ Teacher: _____

CAUSE: Unsafe Acts (mark basic cause)

1. ☐ operating without authority
2. ☐ operating at unsafe speed
3. ☐ making safety device inoperative
4. ☐ using unsafe equipment or equipment unsafely
5. ☐ unsafe loading, placing, mixing
6. ☐ taking unsafe position
7. ☐ working on moving or dangerous equipment
8. ☐ distraction, teasing, horseplay
9. ☐ failure to use personal protective devices

Why was the unsafe act committed? _____

Unsafe conditions (mark contributing cause, if a

10. ☐ inadequately guarded
11. ☐ defective tools, equipment or substance
12. ☐ hazardous arrangement
13. ☐ unsafe illumination
14. ☐ unsafe ventilation
15. ☐ unsafe clothing
16. ☐ unguarded
17. ☐ unsafe design or construction

Why did the unsafe condition exist? _____

GUIDES TO CORRECTIVE ACTION:

Unsafe Act

1. Stop
2. Study
3. Instruct (tell--show--try--check)
4. Train
5. Maintain discipline

Unsafe Condition

1. Remove
2. Guard
3. Warn
   If supervisor can't handle, then:
4. Recommend for: (a) own supervisor, or
   (b) other supervisors, or
   (c) safety committee, or
   (d) maintenance dept., or
   (e) _____
5. Follow up

Based on the cause checked above, indicate below the corrective action you are taking.

What have you done to prevent similar injuries? _____

MINUTES OF SAFETY COMMITTEE MEETING

School _____ Date _____

Address _____ Time Meeting Opened _____

Members Present: Absent:

_____ _____

_____ _____

_____ _____

_____ _____

Minutes of Previous Meeting Dated _____ were read.

Comments: _____

UNFINISHED BUSINESS AND OLD RECOMMENDATIONS, BY NUMBER ONLY, NOT DISPOSED OF:

_____

_____

_____

_____

RECOMMENDATIONS COMPLETED SINCE LAST MEETING: (Record by recommendation number only)

_____

_____

NEW BUSINESS:

_____ Inspection reports were reviewed and discussed.

NEW RECOMMENDATIONS: (Number consecutively from previous recommendations and describe)

_____

_____

_____

_____

_____

_____

_____

_____

REMARKS: The following accidents which occurred since the last meeting were discussed:

Date of Injury Employee Cause Recommendations

_____

_____

_____

_____

OTHER COMMITTEE REMARKS: _____

_____

Are Safety Posters being regularly received and posted? _____

Put Additional Remarks on the Reverse Side

Meeting adjourned _____ Next Meeting to be Held _____

Signed: _____

Secretary of Committee

ACKNOWLEDGEMENT OF SAFETY INSTRUCTION AND PLEDGE

I have received the SAFETY INSTRUCTIONS regarding the operation of the following power driven machines. I fully understand the importance of these rules and regulations, and I am fully aware that the violation of any one of them may endanger myself and others.

My instructor has demonstrated to me the proper methods of using each machine listed below and has pointed out the safety precautions necessary to avoid injury.

I have demonstrated my ability to use each machine listed below in the presence of my teacher. I understand the safety precautions involved and I understand how to insure my safety through the proper use of the machines. I am confident that I can operate these machines safely. When in doubt about the operation of any machine, or other equipment, I will consult the teacher before proceeding.

(Name of each machine to be written in by the pupil after he/she has passed the safety test and demonstrated the ability to use it.)

NAME OF MACHINE	DATE	STUDENT'S SIGNATURE	TEACHER'S INITIALS
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

I have passed the tests covering safety in the shop and the use of the above-listed machines.

I promise to observe the SAFETY INSTRUCTIONS and to follow the instructions given in the demonstration. I may use the machines only after I have been properly instructed in their safe use, and I have received the approval of the teacher.

School _____ Signed _____ pupil

Date _____ Instructor _____

SAMPLE PERMISSION FORM

_____ has our/my permission to operate the
(student's name)
equipment in the _____ laboratory
at _____ School. It is understood
that instruction in its safe operation will be given before he/she is allowed to
use any piece of equipment and that he/she will be properly supervised at all times.

In the case of an accident, it is preferred that he/she be given treatment by:

Dr: _____

or Dr: _____

Our home phone number is: _____

Our work phone number is: _____

If neither parent/guardian can be reached at the above numbers, please notify:

_____ at _____
(responsible person) (telephone number)

Date: _____

Signed: _____
(father/guardian)

_____
(mother/guardian)

_____
(other—specify relationship)

HAZARDOUS CONDITIONS REPORT

Date _____

TO _____
(Building Administrator) (Position) (School)

Description and Location of Health or Safety Hazard

_____

_____

_____

Suggested Solution

_____

_____

_____

Teacher Signature _____

Distribution: Original - Building Administrator
1st Copy - Department Chairperson
2nd Copy - Teacher Reporting Hazard
3rd Copy - Parish Safety Officer

Action Taken

_____

_____

_____

By Whom _____
(Signature)

OSHA NO. 100

Form Approved
OMB No. 44R-1453

LOG OF OCCUPATIONAL INJURIES AND ILLNESSES

RECORDABLE CASES: You are required to record information about every occupational death, every nonfatal occupational illness, and those nonfatal occupational injuries which involve one or more of the following: loss of consciousness, restriction of work or motion, transfer to another job, or medical treatment (other than first aid).
More complete definitions appear on the other side of this form.

CASE OR FILE NUMBER	DATE OF INJURY OR ONSET OF ILLNESS	EMPLOYEE'S NAME (First name or initial, middle initial, last name)	OCCUPATION (Enter regular job title, not activity employee was performing when injured or at onset of illness.)	DEPARTMENT (Enter department in which the employee is regularly employed.)	DESCRIPTION OF INJURY OR ILLNESS		EXTENT OF AND OUTCOME OF CASES					
								LOST WORKDAY CASES			NONFATAL CASES WITHOUT LOST WORKDAYS (Enter a check if no entry was made in columns 8 or 9 but the case is recordable, as defined above.)	TERMINATIONS OR PERMANENT TRANSFERS (Enter a check if the entry in col. 8 or 10 represented a termination or permanent transfer.)
					Nature of Injury or Illness and Part(s) of Body Affected (Typical entries for this column might be: Amputation of 1st joint right forefinger; Strain of lower back; Contact dermatitis on both hands; Electrocution—body)	Injury or Illness Code (See codes at bottom of page.)	DEATHS (Enter date of death.)	Enter a check if case involved lost workdays.	LOST WORKDAYS			
									Enter number of days AWAY FROM WORK due to injury or illness.	Enter number of days of RESTRICTED WORK ACTIVITY due to injury or illness.		
	Mo./day/yr						Mo./day/yr					
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(9A)	(9B)	(10)	(11)

Company Name _____
Establishment Name _____
Establishment Address _____

NOTE: This is NOT a report form. Keep it in the establishment for 5 years.

Injury Code
10 All occupational injuries

Illness Codes
21 Occupational skin diseases or disorders
22 Dust diseases of the lungs (pneumoconioses)
23 Respiratory conditions due to toxic agents
24 Poisoning (systemic effects of toxic materials)
25 Disorders due to physical agents (other than toxic materials)
26 Disorders associated with repeated trauma
29 All other occupational illnesses

CHANGES IN EXTENT OF OR OUTCOME OF INJURY OR ILLNESS

If, during the 5-year period the log must be retained, there is a change in a case which affects entries in columns 9 or 10, the first entry should be lined out and a new entry made. For example, if an injured employee at first required only medical treatment but later lost workdays, the check in column 10 should be lined out, a check entered in column 9, and the number of lost workdays entered in columns 9A and/or 9B.

In another example, if an employee with an occupational illness lost workdays, returned to work, and then died of the illness, the entries in columns 9, 9A, and/or 9B should be lined out and the date of death entered in column 8.

The entire entry for a case should be lined out if the case is later found to be nonrecordable. Examples are: A case which is later determined not to be work related, or a case which was initially thought to involve medical treatment but later was determined to have involved only first aid.

DEFINITIONS

RECORDABLE OCCUPATIONAL INJURIES AND ILLNESSES are:

1) **OCCUPATIONAL DEATHS**, regardless of the time between injury and death, or the length of the illness; or

2) **OCCUPATIONAL ILLNESSES**; or

3) **OCCUPATIONAL INJURIES** which involve one or more of the following: loss of consciousness, restriction of work or motion, transfer to another job, or medical treatment (other than first aid.)

NOTE: Any case which involves lost workdays must be recorded since it always involves one or more of the criteria for recordability.

OCCUPATIONAL INJURY is any injury such as a cut, fracture, sprain, amputation, etc., which results from a work accident or from an exposure involving a single incident in the work environment.

NOTE: Conditions resulting from animal bites, such as insect or snake bites, or from one-time exposure to chemicals are considered to be injuries.

OCCUPATIONAL ILLNESS of an employee is any abnormal condition or disorder, other than one resulting from an occupational injury, caused by exposure to environmental factors associated with employment. It includes acute and chronic illnesses or diseases which may be caused by inhalation, absorption, ingestion, or direct contact.

The following listing gives the categories of occupational illnesses and disorders that will be utilized for the purpose of classifying recordable illnesses. The classifying codes are those to be used in column 7 of the log. For purposes of information, examples of each category are given. These are typical examples, however, and are not to be considered to be the complete listing of the types of illnesses and disorders that are to be counted under each category.

(21) Occupational Skin Diseases or Disorders
Examples: Contact dermatitis, eczema, or rash caused by primary irritants and sensitizers or poisonous plants; oil acne; chrome ulcers; chemical burns or inflammations, etc.

(22) Dust Diseases of the Lungs (Pneumoconioses)
Examples: Silicosis, asbestosis, coal worker's pneumoconiosis, byssinosis, and other pneumoconioses.

(23) Respiratory Conditions Due to Toxic Agents
Examples: Pneumonitis, pharyngitis, rhinitis or acute congestion due to chemicals, dusts, gases, or fumes; farmer's lung, etc.

(24) Poisoning (Systemic Effects of Toxic Materials)
Examples: Poisoning by lead, mercury, cadmium, arsenic, or other metals; poisoning by carbon monoxide, hydrogen sulfide or other gases, poisoning by benzol, carbon tetrachloride, or other organic solvents; poisoning by insecticide sprays such as parathion, lead arsenate; poisoning by other chemicals such as formaldehyde, plastics and resins, etc.

(25) Disorders Due to Physical Agents (Other Than Toxic Materials)
Examples: Heatstroke, sunstroke, heat exhaustion and other effects of environmental heat; freezing, frostbite and effects of exposure to low temperatures; caisson disease; effects of ionizing radiation (isotopes, X-rays, radium); effects of nonionizing radiation (welding flash, ultraviolet rays, microwaves, sunburn), etc.

(26) Disorders Associated With Repeated Trauma
Examples: Noise-induced hearing loss; synovitis, tenosynovitis, and bursitis; Raynaud's phenomenon; and other conditions due to repeated motion, vibration or pressure.

(29) All Other Occupational Illnesses
Examples: Anthrax, brucellosis, infectious hepatitis, malignant and benign tumors; food poisoning, histoplasmosis, coccidioidomycosis, etc.

MEDICAL TREATMENT includes treatment (other than first aid) administered by a physician or by registered professional personnel under the standing orders of a physician. Medical treatment does NOT include first aid treatment (one-time treatment and subsequent observation of minor scratches, cuts, burns, splinters, and so forth, which do not ordinarily require medical care) even though provided by a physician or registered professional personnel.

ESTABLISHMENT: A single physical location where business is conducted or where services or industrial operations are performed (for example: a factory, mill, store, hotel, restaurant, movie theater, farm, ranch, bank, sales office, warehouse, or central administrative office). Where distinctly separate activities are performed at a single physical location (such as construct construction activities operated from the same physical location as a lumber yard), each activity shall be treated as a separate establishment.

For firms engaged in activities such as agriculture, construction, transportation, communications, and electric, gas and sanitary services, which may be physically dispersed, records may be maintained at a place to which employees report each day.

Records for personnel who do not primarily report or work at a single establishment, such as traveling salesmen, technicians, engineers, etc., shall be maintained at the location from which they are paid or the base from which personnel operate to carry out their activities.

WORK ENVIRONMENT is comprised of the physical location, equipment, materials processed or used, and the kinds of operations performed by an employee in the performance of his work, whether on or off the employer's premises.

LOG OF OCCUPATIONAL INJURIES AND ILLNESSES

Each employer who is subject to the recordkeeping requirements of the Occupational Safety and Health Act of 1970 must maintain for each establishment a log of all recordable occupational injuries and illnesses. This form (OSHA No. 100) may be used for that purpose. A substitute for the OSHA No. 100 is acceptable if it is as detailed, easily readable and understandable as the OSHA No. 100.

Each recordable occupational injury and occupational illness must be timely entered on the log. Logs must be kept current and retained for five (5) years following the end of the calendar year to which they relate. Logs must be available continually at the establishment for inspection and copying by representatives of the Department of Labor, or the Department of Health, Education and Welfare, or States accorded jurisdiction under the Act.

INSTRUCTIONS FOR COMPLETING LOG OF OCCUPATIONAL INJURIES AND ILLNESSES

Column 1 - CASE OR FILE NUMBER

Enter a number which will facilitate comparison with supplementary records. Any series of nonduplicating numbers may be used.

Column 2 - DATE OF INJURY OR ONSET OF ILLNESS

For occupational injuries enter the date of the work accident which resulted in injury. For occupational illnesses enter the date of initial diagnosis of illness, or, if absence from work occurred before diagnosis, enter the first day of the absence attributable to the illness which was later diagnosed or recognized.

Column 3 - EMPLOYEE'S NAME

Column 4 - OCCUPATION

Enter regular job title, not the specific activity being performed at time of injury or illness. In the absence of a formal occupational title, enter a brief description of the duties of the employee.

Column 5 - DEPARTMENT

Enter the name of the department or division in which the injured person is regularly employed, even though temporarily working in another department at the time of injury or illness. In the absence of formal department titles, enter a brief description of normal workplace to which employee is assigned.

Column 6 - NATURE OF INJURY OR ILLNESS AND PART(S) OF BODY AFFECTED

Enter a brief description of the injury or illness and indicate the part or parts of body affected. Where entire body is affected, the entry "body" can be used.

Column 7 - INJURY OR ILLNESS CODE

Enter the one code which most accurately describes the case. A list of the codes appears at the bottom of the log. A more complete description of recordable occupational injuries and illnesses appears in "DEFINITIONS."

Column 8 - DEATHS

If the occupational injury or illness resulted in death, enter date of death.

Column 9 - LOST WORKDAY CASES

Enter a check for each case which involves days away from work, or days of restricted work activity, or both. Each lost workday case also requires an entry in column 9A or column 9B, or both.

Column 9A - LOST WORKDAYS: DAYS AWAY FROM WORK

Enter the number of workdays (consecutive or not) on which the employee would have worked but could not because of occupational injury or illness. The number of lost workdays should not include the day of injury or onset of illness or any days on which the employee would not have worked even though able to work.

NOTE: For employees not having a regularly scheduled shift, i.e., certain truck drivers, construction workers, farm labor, casual labor, part-time employees, etc., it may be necessary to estimate the number of lost workdays. Estimates of lost workdays shall be based on prior work history of the employee AND days worked by employees, not ill or injured, working in the department and/or occupation of the ill or injured employee.

Column 9B - LOST WORKDAYS - DAYS OF RESTRICTED WORK ACTIVITY

Enter the number of workdays (consecutive or not) on which because of injury or illness:

1) the employee was assigned to another job on a temporary basis, or
2) the employee worked at a permanent job less than full time, or
3) the employee worked at a permanently assigned job but could not perform all duties normally connected with it.

The number of lost workdays should not include the day of injury or onset of illness or any days on which the employee would not have worked even though able to work.

Column 10 - NONFATAL CASES WITHOUT LOST WORKDAYS

Enter a check for any recordable case which does not involve a fatality or lost workdays.

Column 11 - TERMINATIONS OR PERMANENT TRANSFERS

Enter a check if the entry in columns 9 or 10 represented a termination of employment or permanent transfer.

OSHA No. 101
Case or File No. _____

Form approved
OMB No. 44R 1453

Supplementary Record of Occupational Injuries and Illnesses

EMPLOYER

1. Name _____
2. Mail address _____
   (No. and street) (City or town) (State)
3. Location, if different from mail address _____

INJURED OR ILL EMPLOYEE

4. Name _____ Social Security No. _____
   (First name) (Middle name) (Last name)
5. Home address _____
   (No. and street) (City or town) (State)
6. Age _____ 7. Sex: Male_____ Female_____ (Check one)
8. Occupation _____
   (Enter regular job title, *not* the specific activity he was performing at time of injury.)
9. Department _____
   (Enter name of department or division in which the injured person is regularly employed, even though he may have been temporarily working in another department at the time of injury.)

THE ACCIDENT OR EXPOSURE TO OCCUPATIONAL ILLNESS

10. Place of accident or exposure _____
    (No. and street) (City or town) (State)
    If accident or exposure occurred on employer's premises, give address of plant or establishment in which it occurred. Do not indicate department or division within the plant or establishment. If accident occurred outside employer's premises at an identifiable address, give that address. If it occurred on a public highway or at any other place which cannot be identified by number and street, please provide place references locating the place of injury as accurately as possible.
11. Was place of accident or exposure on employer's premises? _____ (Yes or No)
12. What was the employee doing when injured? _____
    (Be specific. If he was using tools or equipment or handling material, name them and tell what he was doing with them.)
13. How did the accident occur? _____
    (Describe fully the events which resulted in the injury or occupational illness. Tell what happened and how it happened. Name any objects or substances involved and tell how they were involved. Give full details on all factors which led or contributed to the accident. Use separate sheet for additional space.)

OCCUPATIONAL INJURY OR OCCUPATIONAL ILLNESS

14. Describe the injury or illness in detail and indicate the part of body affected. _____
    (e.g.: amputation of right index finger at second joint; fracture of ribs; lead poisoning; dermatitis of left hand, etc.)
15. Name the object or substance which directly injured the employee. (For example, the machine or thing he struck against or which struck him; the vapor or poison he inhaled or swallowed; the chemical or radiation which irritated his skin; or in cases of strains, hernias, etc., the thing he was lifting, pulling, etc.)
16. Date of injury or initial diagnosis of occupational illness _____
    (Date)
17. Did employee die? _____ (Yes or No)

OTHER

18. Name and address of physician _____
19. If hospitalized, name and address of hospital _____

Date of report _____ Prepared by _____
Official position _____

SUPPLEMENTARY RECORD OF OCCUPATIONAL INJURIES AND ILLNESSES

To supplement the Log of Occupational Injuries and Illnesses (OSHA No. 100), each establishment must maintain a record of each recordable occupational injury or illness. Workmen's compensation, insurance, or other reports are acceptable as records if they contain all facts listed below or are supplemented to do so. If no suitable report is made for other purposes, this form (OSHA No. 101) may be used or the necessary facts can be listed on a separate plain sheet of paper. These records must also be available in the establishment without delay and at reasonable times for examination by representatives of the Department of Labor and the Department of Health, Education and Welfare, and States accorded jurisdiction under the Act. The records must be maintained for a period of not less than five years following the end of the calendar year to which they relate.

Such records must contain at least the following facts:

1) *About the employer*—name, mail address, and location if different from mail address.

2) *About the injured or ill employee*—name, social security number, home address, age, sex, occupation, and department.

3) *About the accident or exposure to occupational illness*—place of accident or exposure, whether it was on employer's premises, what the employee was doing when injured, and how the accident occurred.

4) *About the occupational injury or illness*—description of the injury or illness, including part of body affected; name of the object or substance which directly injured the employee; and date of injury or diagnosis of illness.

5) *Other*—name and address of physician; if hospitalized, name and address of hospital; date of report; and name and position of person preparing the report.

SEE *DEFINITIONS* ON THE BACK OF OSHA FORM 100.

OSHA No. 102

Complete no later than one month after close of calendar year. See back of this form for posting requirements and instructions.

Form Approved
OMB No. 44R 1453

SUMMARY OF OCCUPATIONAL INJURIES AND ILLNESSES FOR CALENDAR YEAR 19__

Use previous edition of this form for summarizing your 1974 cases. This edition is for summarizing your cases for 1975 and subsequent years.

Establishment:
NAME _____
ADDRESS _____

INJURY AND ILLNESS CATEGORY		TOTAL CASES	DEATHS	LOST WORKDAY CASES				NONFATAL CASES WITHOUT LOST WORKDAYS	TERMINATIONS OR PERMANENT TRANSFERS
				Total Lost Workday Cases	Cases Involving Days Away From Work	Days Away From Work	Days of Restricted Work Activity		
CATEGORY	CODE	Number of entries in Col. 7 of the log. (1)	Number of entries in Col. 8 of the log. (2)	Number of checks in Col. 9 of the log. (3)	Number of entries in Col. 9A of the log. (4)	Sum of entries in Col. 9A of the log. (5)	Sum of entries in Col. 9B of the log. (6)	Number of checks in Col. 10 of the log. (7)	Number of checks in Col. 11 of the log. (8)
OCCUPATIONAL INJURIES	10								
OCCUPATIONAL ILLNESSES: Occupational Skin Diseases or Disorders	21								
OCCUPATIONAL ILLNESSES: Dust Diseases of the Lungs	22								
OCCUPATIONAL ILLNESSES: Respiratory Conditions Due to Toxic Agents	23								
OCCUPATIONAL ILLNESSES: Poisoning (Systemic Effects of Toxic Materials)	24								
OCCUPATIONAL ILLNESSES: Disorders Due to Physical Agents	25								
OCCUPATIONAL ILLNESSES: Disorders Associated With Repeated Trauma	26								
OCCUPATIONAL ILLNESSES: All Other Occupational Illnesses	29								
OCCUPATIONAL ILLNESSES: TOTAL–OCCUPATIONAL ILLNESSES (Sum of codes 21 through code 29)	30								
TOTAL–OCCUPATIONAL INJURIES AND ILLNESSES (Sum of code 10 and code 30)	31								

This is NOT a report form. Keep it in the establishment for 5 years.

I certify that this Summary of Occupational Injuries and Illnesses is true and complete, to the best of my knowledge.

Signature _____
Title _____
Date _____

SUMMARY OF OCCUPATIONAL INJURIES AND ILLNESSES

Every employer who is subject to the recordkeeping requirements of the Occupational Safety and Health Act of 1970 must use this form to prepare an annual summary of the occupational injury and illness experience of the employees in each of his establishments within one month following the end of each year.

POSTING REQUIREMENTS: A copy or copies of the summary must be posted at each establishment in the place or places where notices to employees are customarily posted. This summary must be posted no later than February 1 and must remain in place until March 1.

INSTRUCTIONS for completing this form: All entries must be summarized from the log (OSHA No. 100) or its equivalent. Before preparing this summary, review the log to be sure that entries are correct and each case is included in only one of the following classes: deaths (date in column 8), lost workday cases (check in column 9), or nonfatal cases without lost workdays (check in column 10). If an employee's loss of workdays is continuing at the time the summary is being made, estimate the number of future workdays he will lose and add that estimate to the workdays he has already lost and include this total in the summary. No further entries are to be made with respect to such cases in the next year's summary.

Occupational injuries and the seven categories of occupational illnesses are to be summarized separately. Identify each case by the code in column 7 of the log of occupational injuries and illnesses.

The summary from the log is made as follows:

A. For occupational injuries (identified by a code 10 in column 7 of the log form) make entries on the line for code 10 of this form.

Column 1—Total Cases. Count the number of entries which have a code 10 in column 7 of the log. Enter this total in column 1 of this form. This is the total of occupational injuries for the year.
Column 2—Deaths. Count the number of entries (date of death) for occupational injuries in column 8 of the log.
Column 3—Total Lost Workday Cases. Count the number of checks for occupational injuries in column 9 of the log.
Column 4—Cases Involving Days Away From Work. Count the number of entries for occupational injuries in column 9A of the log.
Column 5—Days Away From Work. Add the entries (total days away) for occupational injuries in column 9A of the log.
Column 6—Days of Restricted Work Activity. Add the entries (total of such days) for occupational injuries in column 9B of the log.
Column 7—Nonfatal Cases Without Lost Workdays. Count the number of checks for occupational injuries in column 10 of the log.
Column 8—Terminations or Permanent Transfers. Count the number of checks for occupational injuries in column 11 of the log.
CHECK: If the totals for code 10 have been entered correctly, the sum of columns 2, 3, and 7 will equal the number entered in column 1.

B. Follow the same procedure for each illness code, entering the totals on the appropriate line of this form.

C. Add the entries for codes 21 through 29 in each column for occupational illnesses and enter totals on the line for code 30.

D. Add the entries for codes 10 and 30 in each column and enter totals on the line for code 31.

CHECK: If the summary has been made correctly, the entry in column 1 of the total line (code 31) of this form will equal the total number of cases on the log.

The person responsible for the preparation of the summary shall certify that it is true and complete by signing the statement on the form.

Use previous edition of this form for summarizing your 1974 cases. This edition is for summarizing your cases for 1975 and subsequent years. Forms for the 1974 summary can be obtained from the appropriate State statistical grant agency (if there is one in your State) or from the appropriate Regional Office of the Bureau of Labor Statistics. Addresses are in the booklet entitled Recordkeeping Requirements under the Occupational Safety and Health Act of 1970.

UNIT IX

SAMPLE TESTS FOR KNOWLEDGE OF SAFETY COMMON TO ALL SHOP AREAS

Before students are allowed to enter into lab/shop work areas, they should be required to review general shop safety regulations, observe safety demonstrations presented by the instructor and to enter into safety discussions. Then, each student, at the appropriate times, should be administered safety examinations.

Safety test items missed by a student should then be corrected by the student to be sure that he/she has been made aware of the correct answers to the items missed. The instructor should then file the corrected exams for future reference, as needed.

On the following pages are sample exams for testing general shop safety knowledge.

Name: _____ Class: _____ Date: _____

Safety Exam #1

GENERAL SAFETY PRACTICES

I. Multiple Choice. For each item below select the one best answer. Then write the letter that represents your choice on the line to the left of each item.

_____ 1. Why should bench and cabinet drawers and locker doors be kept closed?

A. To avoid breaking the drawers and doors
B. To make the shop look uniform
C. To avoid walking hazards
D. To avoid spilling the contents

_____ 2. The first person to whom all injuries, however slight, should be reported is:

A. The nearest student
B. The counselor
C. The teacher
D. The principal

_____ 3. All injuries should be reported to the teacher:

A. So he/she can fill out an accident report
B. So the hazard can be eliminated
C. So the injured party can receive first aid or be taken to the doctor, if necessary
D. So the cause of the accident can be investigated
E. All of the above

_____ 4. The main reason throwing small pieces of metal in the shop is prohibited is:

A. There is a danger of eye injury
B. You may hit the teacher
C. You may throw away a piece you will need later
D. Windows and lights will be broken

_____ 5. Horseplay and practical joking are prohibited in the shop because:

A. There is not enough room for play
B. Playing should be confined to the gymnasium
C. You may break some tools
D. It prevents other students from working
E. You may injure yourself or someone else

_____ 6. Students should be especially alert to danger from accidents under which of the following conditions?

A. When using unfamiliar tools
B. When hurrying to complete a project
C. When the teacher is out of the room
D. All of the above

_____ 7. Who should take chances in the shop?

A. No one
B. The instructor
C. Students
D. The school maintenance workers

_____ 8. If a piece of equipment does not seem to work properly, you should:

A. Try to repair it
B. Tell the instructor
C. Call the maintenance shop
D. Continue to operate it until it quits completely

_____ 9. What is the main reason for not allowing tools and materials to project over the edges of work benches?

A. The tools and materials will become damaged
B. The benches may get scratched
C. Someone may walk into the tools or materials and get injured

_____10. Long or heavy items should be carried:

A. By one person
B. By two or more people
C. In one hand
D. By the instructor

_____11. When a fire alarm sounds or a weather emergency occurs, you should:

A. Leave all your tools and materials where they are and leave by the closest door
B. Put away your supplies and go home
C. Follow procedures designated by the school authorities
D. Run to all rooms in the school to be sure everyone is out

_____12. Shop safety practices should be followed by:

A. Accident-prone persons
B. Inexperienced shop students
C. Pupils operating equipment
D. All people working in the laboratory

_____13. A fire is considered a Class A fire when:

A. Combustilble metals are burning
B. Wood, paper and trash are burning
C. Electrical equipment is on fire
D. Gasoline or grease is burning

_____14. It is permissible to run in the shop when:

A. You are in a hurry
B. There is a fire drill or other emergency
C. The teacher calls you
D. Someone has been hurt
E. You should never run in the shop

_____15. To be prepared for a fire emergency, a person should know:

A. How to operate the various kinds of fire extinguishers
B. Which extinguishers to use on different types of fires
C. The location of extinguishers in the shop
D. All of the above

_____16. Injuries are most likely to occur to persons who:

A. Violate safety regulations
B. Do nothing
C. Consider safety in all that they do

_____17. The best way to learn the proper way to react during emergencies is to:

A. Follow all regulations at all times
B. Learn the rules well but only follow them in emergencies
C. Do what comes naturally since "common sense" will direct you to act safely

_____18. Persons feeling ill:

A. Should never operate machines
B. May operate machines so long as they don't get dizzy
C. Should report to the instructor immediately
D. doth A and C

_____19. If a foreign particle becomes embedded in your eye:

A. Ask another student to remove it
B. Report to your instructor
C. Flush your eye with water
D. Rub your eye

II. True—False. If you believe the statement is true, circle the "T," if you believe it is false, circle the "F."

T F 1. Fire extinguishers should be used only by the instructor or the school's administrators.

T F 2. Ventilation systems need to be turned on only when the temperature is too hot in a work area.

T F 3. Every person should take the responsibility to caution others if they are violating safety rules.

T F 4. Oil should be left all over hand tools to keep them from rusting.

T F 5. Compressed air can be dangerous.

Name: _____ Class: _____ Date: _____

Safety Exam #2

PERSONAL PROTECTION

Multiple Choice. For each item below select the one best answer. Then write the letter that represents your choice on the line to the left of each item.

_____ 1. Gloves should be worn in the shop in all of the following situations, except:

A. When handling rough boards, metal subject to burrs, or glass
B. When operating machines
C. When performing operations which produce blister-causing friction
D. When heat is involved, as in foundry work

_____ 2. You should wear suitable eye protection:

A. To improve your vision
B. When engaged in any activity where eye hazards may exist
C. To avoid myopia
D. When you want to improve your appearance

_____ 3. You should fasten or remove loose clothing and roll your sleeves above your elbows:

A. Before operating any machines
B. During the operation of any machines
C. After operating a machine
D. Only when assisting the teacher

_____ 4. Students working in the shop should wear clothes that do not hang loosely because:

A. Shop students should all dress alike
B. Shop students should be different from other students
C. Loose clothing is a safety hazard

_____ 5. When working in a shop individuals should dress carefully because:

A. Visitors like to see well-dressed workers
B. Good clothes are apt to be torn
C. Improper clothing is dangerous

_____ 6. Hand protection is advised to protect you from:

A. Splinters and blisters
B. Chemical burns or skin irritations
C. Abrasion
D. All of the above

_____ 7. The main purpose for wearing safety glasses is to:

A. Obey the law
B. Develop a good work habit
C. Protect the teacher from a law suit
D. Protect yourself fron an eye injury

_____ 8. Wear proper goggles, face shields, aprons and other personal protective equipment:

A. Only when the instructor is in the room
B. On all jobs which require them
C. Only when forced to do so

_____ 9. When handling rough or heavy stock:

A. Wear gloves
B. Wear safety shoes
C. Wear a heavy apron
D. All of the above

_____10. When welding:

A. Eye protection is not important
B. Wear the proper type, color, and shade of welding lens
C. Sunglasses afford adequate protection
D. Any goggles will do

_____11. Jewelry:

A. Should never be worn in the shop
B. Should all be removed when working in the shop except rings
C. Should not be worn while welding, but is approved for other operations
D. Can be worn if the student wishes

_____12. When harmful dust or fumes are present, a student should:

A. Avoid breathing until he leaves the area
B. Wear a respirator
C. Wear a face mask

_____13. Flammable liquids may be used for cleaning when:

A. They are the only solutions available
B. Regular cleaning solutions are not effective
C. They are the most convenient alternate
D. They should never be used for cleaning

_____14. During hazardous operations in cutting metal, wood or similar material, students should:

A. Wear face shields
B. Wear gloves
C. Never wear loose clothing
D. Wear ear protection if there is excessive noise
E. Do all of the above

_____15. When working with electricity, workers should:

A. Wear special shoes
B. Wear gloves
C. Roll sleeves above their elbows
D. Wear rubberized protective equipment

_____16. Workers performing operations which produce intense radiant energy:

A. Should wear canvas or heavy cotton gloves
B. Should wear helmets and hand shields
C. Should wear face shields
D. Should wear rubberized protective equipment

_____17. Protection against dirt and grease is offered by:

A. Coveralls
B. Aprons
C. Shop coats
D. All of the above

_____18. Students working around machine tools or rotating equipment should:

A. Remove ties and jewelry
B. Tuck in shirt tails
C. Confine long hair
D. All of the above

_____19. Skin disease can best be prevented by:

A. Rinsing skin with warm water
B. Avoiding all chemicals and dirty containers
C. Wash frequently with soap and water

Name: _____ Class: _____ Date: _____

Safety Exam #3

USE OF EQUIPMENT AND TOOLS

I. Multiple Choice. For each item below select the one best answer. Then write the letter that represents your choice on the line to the left of each item.

_____ 1. The operator's zone around a machine is designated to protect:

A. The power equipment
B. The teacher
C. The student operating the machine
D. Everyone working in the shop

_____ 2. Before using any power equipment, you should obtain permission from:

A. An advanced student
B. The principal
C. The instructor
D. The office

_____ 3. If you notice any breakage or damage to a tool, instrument, or machine you should:

A. Ask an advanced student to repair it
B. Be careful when you use it
C. Say nothing, because you might be blamed
D. Notify your teacher

_____ 4. When using a knife, you should:

A. Pull the knife toward you
B. Strike the blade with a hammer to make large cuts
C. Use the pointed end only
D. Cut away from your body and hands

_____ 5. It is necessary to secure the teacher's permission before operating power equipment because:

A. Only certain students are allowed to operate machines
B. It may not be the proper machine to use
C. You should never attempt to operate a machine until you have been given appropriate instructions
D. It may need to be checked and oiled

_____ 6. Closely watch both your work and your fingers when using the grinder because:

A. You may burn either or both
B. The grinding wheel may cause them to slip off the guard
C. The material being ground may be too small to hold
D. Your fingers may come in contact with the grinding wheel and cause a painful accident

_____ 7. Care must be exercised when cutting with a chisel and hammer because:

A. There is a danger of driving metal toward other students
B. The chisel may slip from your hand
C. You may injure yourself or someone else
D. You may miss the chisel and hit your hand
E. All of the above

_____ 8. Broken or battered tools should not be used because:

A. One cannot do good work with them
B. They are apt to slip and spoil work
C. They show one to be a poor mechanic
D. Broken tools tend to cause accidents

_____ 9. Switches on machines should not be turned on until:

A. You have been instructed in the use of the machine
B. You have had your setup approved
C. Everything is clear
D. You definitely know what you are going to do
E. All of the above

_____10. If a student is not sure about the operation of a certain piece of equipment, he should:

A. Be instructed in its proper use by the shop teacher
B. Read the instructor's manual
C. Ask an advanced student to show him how to use it
D. Any of the above is acceptable

_____11. A student should not "meddle" with machinery he is not working with because:

A. He might damage the machinery
B. He might damage someone else's work left on the machine
C. He might cause injury to himself and others

_____12. In all shop work, the most important consideration for the student should be:

A. The speed of production
B. The accuracy in his work
C. The safety of himself and others

_____13. Safety education in the school shop is important because:

A. The state law requires it
B. It decreases fears of parents
C. It helps students develop safe work practices
D. It makes faster workers

_____14. It is acceptable to allow tools and materials to project over the benches when:

A. The main part of the weight is centered over the bench
B. You are holding the projecting part in your hand or with pliers
C. It is never acceptable to allow tools and materials to project over the edge of the work bench.

_____15. Persons not involved in a specific project in the shop should:

A. Hang around watching fellow classmates
B. Keep clear of operators unless specifically instructed to observe
C. Stand around in the corner telling jokes, or lean on machinery not in use

_____16. Machines should be cleaned after use with a:

A. Brush
B. Hand
C. Rag
D. None of the above

_____17. For any job, always use:

A. The tool which is handiest
B. Any likely substitute available
C. Only the correct tool for the job

_____18. Cutting tools should <u>never</u> be:

A. Allowed to become dull
B. Carried in your pocket
C. Left lying around the work area
D. Pointed at others
E. Handed to others pointed end first
F. All of these

_____19. Before starting a machine, make sure:

A. The instructor is out of the room
B. You have someone else help you operate the machine
C. The machine is oiled and all safety guards are operative and in place

_____20. When operating with small materials:

A. Hold material with hands
B. Secure material with a vise or clamp
C. Material need not be secured

_____21. When working with power tools:

A. Keep your mind on the job
B. Be careful
C. Plan exactly what you will do before starting
D. All of the above

_____22. Never leave a machine until:

A. The switch is turned off and it has completely stopped running
B. You need another tool
C. Another student challenges you for the use of the machine

_____23. When cleaning, oiling, adjusting, or repairing a machine:

A. Always make sure it has completely stopped
B. Make sure the power switch is locked in an "off" position
C. Replace the guards immediately thereafter
D. All of the above

_____24. When using a machine for a small or quick job:

A. It is not necessary to put on protective equipment
B. Always take time to put on the necessary protective equipment
C. Rely on machine guards to provide adequate protection

_____25. Machines should be operated:

A. By a work team
B. By partners
C. Only with the instructor's assistance
D. By only one person at a time
E. Any of the above is acceptable

_____26. If a machine does not seem to be running properly:

A. Twist the adjustments and see if it gets better
B. Leave it running and go get the instructor
C. Have someone stop and start it for you so you can watch the moving parts
D. Try oiling or cleaning while it runs to get to its parts better
E. None of the above

_____27. When operating a machine with revolving parts, you should:

A. Always allow all of the parts to stop on their own
B. Stop the parts with your hand after they have slowed down
C. Clean while the parts are still moving
D. Grab the chuck and the spindles to get them out of the way

_____28. Shields should be used to:

A. Stop flying chips, sparks, or particles
B. Protect the people working in the area
C. Prevent contact with power transmission devices
D. All of the above

_____29. Machines should come to a complete stop before:

A. They are oiled, adjusted, or repaired
B. The work is removed
C. A new setup is made
D. The operator leaves the machine
E. All of the above

_____30. Grinding wheels should be replaced when:

A. They show cracks
B. They get off balance
C. They are worn too small to allow proper clearance
D. The speed of the motor and the wheel are appropriate
E. All of the above

_____31. A machine should be used:

A. Only after it reaches its proper operating rpm
B. As soon as it starts moving
C. At different rpm's, depending on the specific project

_____32. All of the following are rules for working with tools <u>except</u>:

A. Clean and replace them in the proper location after their use
B. Use the proper size and type of tool for a specific job
C. Leave the tools in an area where they were used for other students to use later
D. Control portable electric tools with one hand while the other supplies the power

II. True—False. If you believe the statement is true, circle the "T," and if you believe it is false, circle the "F."

T F 1. You should not leave your machine while it is running.

T F 2. Chips should be cleared away from machines with a brush or a piece of wood.

T F 3. Moving gears and belts may be exposed if a caution sign is posted nearby.

T F 4. Tools should be passed from you to another person with the handles forward.

T F 5. Small work items should be held in one hand while cutting or drilling.

Name:_____ Class:_____ Date:_____

Safety Exam #4

FLAMMABLE AND COMBUSTIBLE LIQUIDS

Multiple Choice. For each item below select the one best answer. Then, write the letter that represents your choice on the line to the left of each item.

_____ 1. Rags containing oil, gasoline, alcohol, shellac, varnish, or lacquer must be:

A. Kept in a covered metal container
B. Stored in a wastebasket
C. Folded neatly and placed on a shelf
D. Burned immediately
E. Laid out to dry

_____ 2. Combustible materials such as gasoline, naptha, kerosene, etc., should be:

A. Stored in fireproof containers
B. Used only in designated areas
C. Kept away from fire areas
D. All the above

_____ 3. Most solvents should be stored in special safety containers because:

A. They produce poisonous fumes
B. They are flammable
C. They can stain clothing
D. They can damage a person's skin

_____ 4. Which is more easily ignited?

A. Flammables
B. Combustibles
C. They are equally ignitable

_____ 5. Gasoline, acetone, and lacquer thinner are:

A. Flammables
B. Combustibles

_____ 6. Kerosene, fuel oil, mineral spirits, and brake fluid are examples of:

A. Flammables
B. Combustibles

____ 7. Spontaneous combustion is when:

A. Vapors accumulated along the floor catch fire at the first spark
B. A fire is caused by mixing flammables with certain chemicals
C. Fire occurs as a result of rags or waste oxidizing or releasing heat

____ 8. Flammables and combustibles are dangerous because:

A. They are easily ignited
B. Vapors may cause health problems
C. Contact with skin may cause a rash
D. Fires produce smoke which is dangerous by itself
E. All of the above

____ 9. Ventilation of the area where flammables and combustibles are is important because:

A. It reduces the chance vapors will accumulate
B. It reduces flammability or combustibility of the liquid
C. It provides an escape route in case of emergency

____10. When mixing resin and a catalyst:

A. Resin should be added to a catalyst
B. A catalyst should be added to resin
C. They should be poured in a third container spontaneously

____11. To minimize chances of skin irritations when working with flammable or combustible liquids, a worker should:

A. Wear rubber gloves
B. Thoroughly wash his hands immediately after use
C. Use a funnel when pouring
D. All of the above

____12. Liquids should be stored:

A. In original, marked containers
B. In approved Underwriters' Laboratory safety containers
C. In any available bottle or can
D. Either A or B

____13. Waste or excess liquids should be:

A. Poured back into the original bottles
B. Placed in a closed metal container specified by the instructor taking care not to mix any which might cause a chemical reaction
C. Disposed of daily
D. All of the above

_____14. Keep flammable and combustible liquids away from:

A. Oil drums
B. Welding operations
C. Cutting operations
D. Grinding operations
E. All of the above

Name: _____ Class: _____ Date: _____

Safety Exam #5

ELECTRICAL SAFETY PRACTICES

I. Multiple Choice. For each item below select the one best answer. Then, write the letter that represents your choice on the line to the left of each item.

_____ 1. An electrical fire should be put out with an extinguisher containing:

A. Carbon dioxide
B. Pressurized water
C. A soda-acid solution
D. A saline solution

_____ 2. The location of electrical circuit breakers for an emergency shutoff should be known by:

A. The instructor only
B. The school custodian
C. Members of the student safety committee
D. Everyone who works in the shop

_____ 3. Extension cords:

A. Should be checked periodically for frayed spots
B. Should never be used for permanent connections
C. Should be strung so that they will not become tripping hazards
D. All of the above

_____ 4. Power tools:

A. Should be grounded
B. Should be disconnected when not in use
C. Should be disconnected before being oiled, cleaned, repaired, or adjusted
D. Should not be used on wet floors
E. All of the above

_____ 5. To find out how a switch operates:

A. Try turning it on
B. Try to deduct it from your knowledge of other switches
C. Ask the instructor

_____ 6. A circuit should be tested:

A. By touching the raw wires
B. By plugging in an electric tool and trying to turn it on
C. By using a test lamp or meter
D. Any of the above is acceptable

_____ 7. When replacing a fuse:

A. Turn off the power
B. Be sure the circuit is protected against an overload
C. Be certain the fuse is of the correct wattage
D. All of the above

_____ 8. All wiring should:

A. Be done temporarily until permanent repairs can be made
B. Be done with wire of correct current-carrying capacity
C. Done only by the custodian
D. Both A and C

II. True—False. If you believe the statement is true, circle the "T," and if you believe it is false, circle the "F."

T F 1. Electrical circuit boxes should be kept closed to avoid having switches turned off or on by unauthorized persons.

T F 2. Most modern electrical tools are approved for use in wet conditions.

T F 3. Extension cords should be used only for temporary electrical connections.

T F 4. Electrical circuits can be safely checked for being "hot" by using a jump wire to arc between the positive and negative poles.

T F 5. Some newer electrical power tools do not require a "third wire" for grounding purposes.

Name: _____ Class: _____ Date: _____

Safety Exam #6

SHOP HOUSEKEEPING PRACTICES

I. Multiple Choice. For each item below select the one best answer. Then, write the letter that represents your choice on the line to the left of each item.

_____ 1. If an area of the floor has oil spilled on it:

A. It should be covered with sand
B. The area should be avoided by everyone until the shop is cleaned
C. It should be wiped and an oil-absorbing compound should be applied

_____ 2. Keeping the floor in proper condition for safe work in the shop is the responsibility of:

A. The custodian
B. The teacher
C. Students
D. Everyone who works in the laboratory

_____ 3. Fire doors, aisles, fire escapes, and stairways should be:

A. Used as storage areas
B. Blocked off
C. Kept clear
D. None of the above

_____ 4. To help clean up oil and other liquid spills, you should use:

A. An oil-absorbing compound
B. Sawdust
C. Lacquer thinner
D. Dry sand

_____ 5. The proper place for cleaning materials is:

A. Behind any door
B. In designated storage areas
C. In a corner out of the work area
D. In the instructor's office

_____ 6. Scraps should be placed:

A. On the corner of the work table
B. In a provided wastebasket
C. On the floor near the work area
D. Stored until the end of the year

_____ 7. Spilled chemicals should be:

A. Left alone
B. Left alone until the instructor is notified
C. Barricaded off
D. Wiped up with a rag

_____ 8. Waste materials should be cleaned up:

A. After each class by the students
B. At the end of the day by the custodian
C. About once a week
D. Only when the litter gets so bad it makes movement difficult

_____ 9. Materials should never be stored:

A. Overhead
B. In passageways
C. In front of exits
D. In any of the above areas

APPENDIX

INDUSTRIAL SAFETY COLOR CODING

The safety color codes developed by the American Standards Association for industrial use should be taught and used in schools teaching vocational or industrial subjects. Standard color codes are as follows:

1. Yellow, due to its high visibility, is used for marking hazards, such as:

   A. Designating the boundaries of the work area around the power machines to keep out all except the operator

   B. Painting all obstructions that present hazards that cannot be removed

   C. Painting the handles of power tools and the adjusting knobs of power machines

   D. Painting a line around the bandsaw and scroll saw blades

2. Orange is used to indicate the dangerous parts of machines, as well as marking:

   A. The inside of gear boxes and electric switch boxes

   B. The inside of pulley covers of all power equipment

   C. Safety starting buttons

   D. A line showing the area covered by a circular saw blade

3. Blue designates caution against starting or using machinery and is further used to paint:

   A. Electric switch plates

   B. The handles of levers and controls that start or stop the equipment

4. Red identifies lights, fire protection equipment, and stop signals, and points out:

   A. Flammable safety cans

   B. Danger signs

   C. Emergency stop buttons

   D. Areas that show the location of all fire extinguishers and fire hoses

5. Green designates safety and it is also used:

   A. To paint the location of first aid equipment

   B. To paint the location of safety equipment, such as gas masks and dust respirators

   C. To color safety signs and slogans

6. Black and white are used for both traffic and good housekeeping markings, and:

   A. To show the location of aisles and directional signs

   B. To paint stripes around emergency equipment to designate that the area must be kept free and clear of debris

7. Purple is used to designate radiation hazards.

MACHINE GUARDING

One of the most important safety considerations in any industrial arts or vocational education laboratory is machine guarding. Until recently, machine hazards were unguarded, and responsibility for the avoidance of such things as sprokets, chains, bolts, pulleys, drive shafts, gears, etc., rested solely on the operator. Modern methods of guarding, virtually nonexistent a half century ago, serve a dual purpose: protection of persons in the vicinity during the operation and the protection of expensive equipment.

Several types of guards exist, and the selection of one over the other should involve consideration of a number of issues. They should allow the student or employee to perform necessary tasks, while protecting him/her from danger. Choice should also be based on the physical layout, the type of operation and material limitations. The three main types are:

1. Enclosure guards: Full enclosure guards are preferred to other types because access to dangerous parts is prevented. Flying or breaking parts can also be contained with this type of guard.

2. Interlocking guards: An interlocking guard should be considered the first alternative if a full enclosure guard is not practical. An interlocking closure guard may be opened or removed as needed. However, there is usually an electrical interlock which makes the machine inoperable while the guard is open. Another type of interlocking or barrier guard uses a bar or electric eye which, when tripped, stops the machine.

3. Automatic guards: The automatic guard works independently of the machine operator, as long as the machine is in motion. Common types of automatic guards are sweep and pushaway devices. This type of guard removes the operator's hand or arm from the danger zone.

Functions of Guards

Basically, machine guards perform five functions:

1. Protection from contact with moving parts: The probability of an operator becoming caught at the point where material is machined should be decreased, and belts and pulleys that provide power to the machine should be enclosed.

2. Protection from work in progress: Metal chips thrown by metal turning operations, wood chips thrown by circular saws, wood kicked back by jigsaws, and hot metal splashed by galvanizing processes are just a few of the unsafe contributions made by material processes. Guards should offer protection from these hazards.

3. Protection from human failure: People sometimes contribute to the existence of unsafe conditions because they do not always think, act, and react at their best because of distraction, worry, illness, curiosity, anger, or fatigue. Attempts to prevent consequences should be made.

4. Protection against mechanical failure: Parts' breakage and possible resultant machinery malfunction should be contained to guard persons from injury caused by uncontrolled forces of machines.

5. Protection against electrical failure: Hazards caused by failure and restoration of electrical power should be decreased by proper guarding of electrical parts.

OSHA Machine Guarding Requirements

Listed below are some of the more common OSHA guarding requirements that apply to the school shop. For additional requirements or more specific information, refer to the appropriate sections of the OSHA provisions.

1. The guard must be affixed to the machine, if possible.

2. Fans less than seven feet above the floor or working level must be guarded with mesh openings not more than one-half inch across.

3. Machines designed for a fixed location must be securely anchored.

4. All V-belts and chain drives must be completely enclosed.

5. Machines must not start automatically when the power is restored after a power failure.

6. Shield the feed rolls or other movable parts of feeder attachments to protect the operator,

7. Table saws must have a hood (guard) that completely covers the saw blade at all times.

8. Except for grooving, dadoing, or rabbeting, a spreader and nonkickback fingers or dogs must be provided on a table saw.

9. Radial arm saws must have an upper hood that encloses the top portion of the blade. The sides and lower portion of the blade are guarded to the full diameter with a device that automatically adjusts to the thickness of the stock.

10. Anti-kickback fingers are also required on a radial arm saw.

11. Direction of the saw blade rotation must be clearly marked.

12. Band saws must be completely enclosed except for the portion from the bottom of the guide rolls to the table.

13. Jointers may not have a knife projecting more than 1/8 inch beyond the cylinder head.

14. Jointer guards must automatically adjust themselves to cover all sections of the head on the working side of the fence and remain in contact with the work at all times. The section of the cutter head in back of the fence must also be guarded.

15. Cutting heads on wood shapers must be enclosed with a cage or an adjustable guard at least as great as the diameter of the cutter.

16. Feed rolls on a planer must be guarded by a hood or suitable guard to prevent the operator's hands from coming in contact with the in-running rolls.

17. The blade of a portable circular saw must be guarded both above and below the base plate or shoe.

18. When the portable circular saw is withdrawn from the work, the lower guard must automatically and instantly return to a covering position.

19. Disc sanders require an enclosed disc except for the portion of the disc above the table.

20. Belt sanders require guards at each nip point where the sanding belt runs onto a pulley. The unused portion of the sanding belt must be guarded against accidental contact.

21. Wood lathes used for turning long pieces of stock held only between the two centers must have long, curved guards extending over the top of the lathe to prevent the work pieces from being thrown out of the lathe if they become loose.

22. The tops and sides of the router must be covered.

23. Wheel safety guards must cover the spindle end, nut, and flange of a grinder.

24. The exposed area of a grinding wheel should not exceed more than one-fourth of the area of the entire grinding wheel.

25. Hand held electric power tools must be equipped with "dead man" or "quick-release" control so that the power can be shut off when the operator releases the control.

26. All roller type printing machines must be equipped with nip guards.

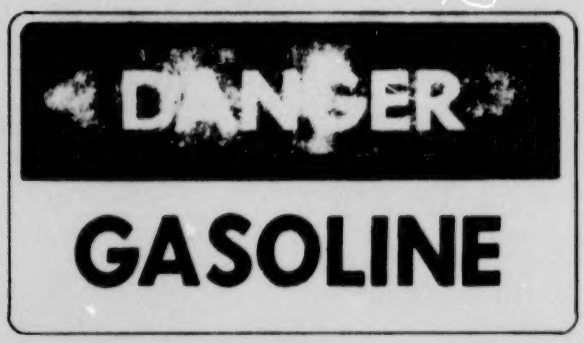
27. Each employer shall be responsible for the safe condition of tools and equipment and the provision of guards on all tools requiring them.

SAFETY SIGNS, TAGS AND POSTERS

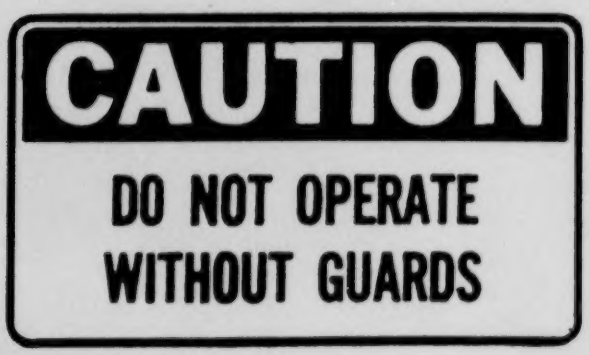
Safety Signs

Signs used to promote safety and to warn of specific hazards present in the shop at any given time should be short and descriptive so they can be quickly and easily understood. The heading and colors of the signs should be in keeping with standards presented, which are determined by industrial safety color coding and OSHA standards.

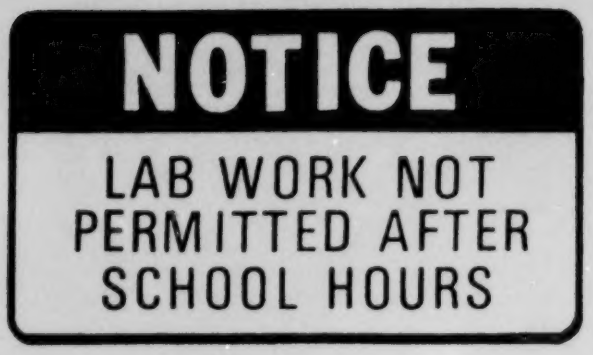
Signs warning of real or potential hazards should be visible to all persons at all times, and should be removed or covered immediately when the hazard no longer exists. They should be posted for maximum visibility, usually at eye level.



DANGER—White letters on a red oval surrounded by a rectangular black field. "Danger signs should be used only where an immediate hazard exists. There shall be no variation in the type of design of signs posted to warn of specific dangers and radiation hazards."



CAUTION—Yellow letters on a black field. "Caution signs shall be used only to warn against potential hazards or to caution against unsafe practices."



NOTICE—White letters on a blue field. "Blue shall be the standard color for informational signs. It may be used as the background color for the complete signs or as a panel at the top of such 'Notice' signs which have a white background."

DIRECTIONAL SIGNS—Other than automotive traffic signs, directional signs shall be white with a black panel and a white directional symbol. Any additional wording on the sign shall be done in black letters on the white background.

SAFETY FIRST—White letters on a green field. "Safety instruction signs shall be used where there is a need for general instructions and suggestions relative to safety measures."

In addition to the above examples, OSHA regulations specify that signs be posted in the following areas that are sometimes present in school shops:

1. Fire Control (red):

   Location of portable fire extinguishers shall be conspicuously marked.
   Direction to nearest fire extinguisher must be marked.
   Fire hose must be marked.
   Fire door must be marked to insure clear path.

2. Electromechanical Hazards:

   Entrance to room containing exposed electrical parts shall be marked indicating the potential dangers inside.
   Switch boxes and switches with high voltage, leads and disconnects should be identified.

3. Exits and Entrances:

   Identify exits.
   Identify doors which are not exits with "no exit" marking.
   Indicate areas off limits to visitors with "Authorized Personnel Only" sign.

4. Storage:

   Mark areas containing explosives, toxins and hazardous substances with warning signs.
   Cabinets containing flammable and combustible liquids should be marked "Flammables—Keep Fire Away" and "Danger: No Smoking."

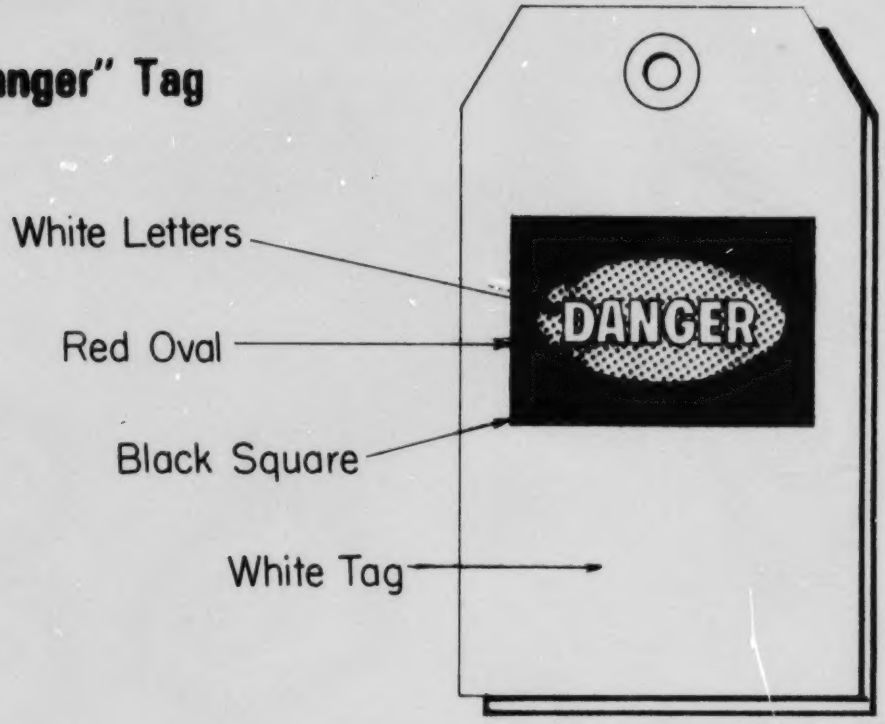
5. Miscellaneous:

   Respirator storage compartments should be marked.
   Toilet facilities should be marked distinctly "Men" and "Women."

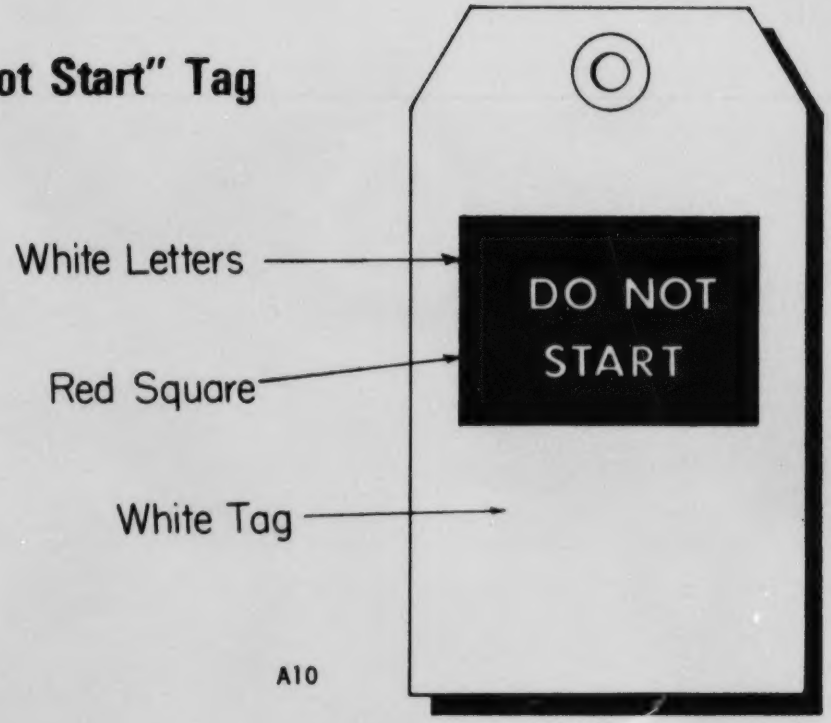
Safety Tags

Defective machinery and specific hazards should be marked with tags like the samples following. Instructors should use these and other tags to help provide a safer work environment for students.

"Danger" Tag

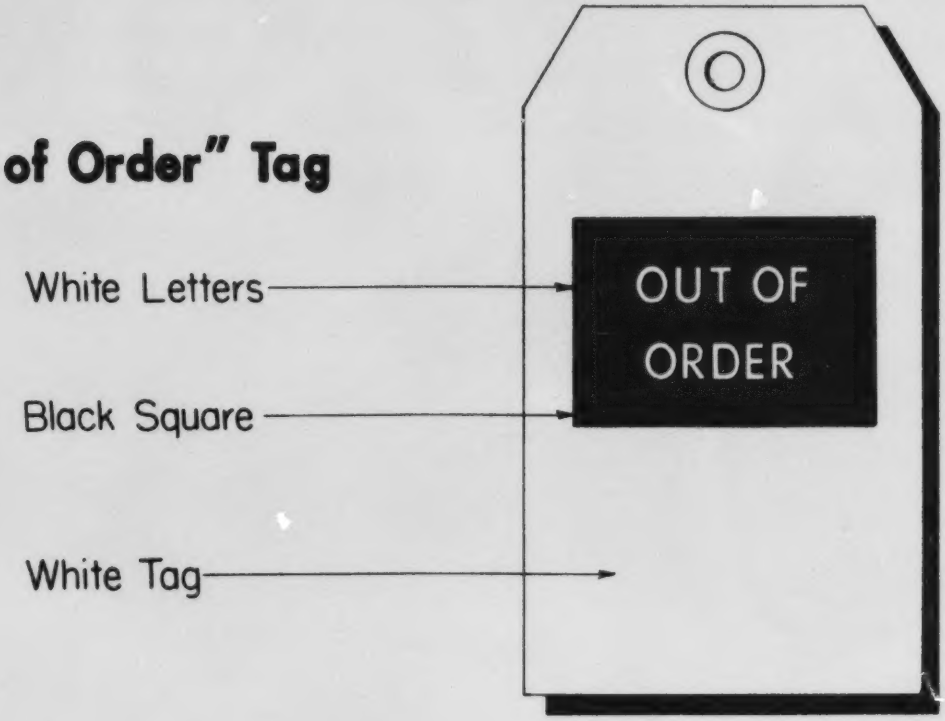


"Do Not Start" Tag

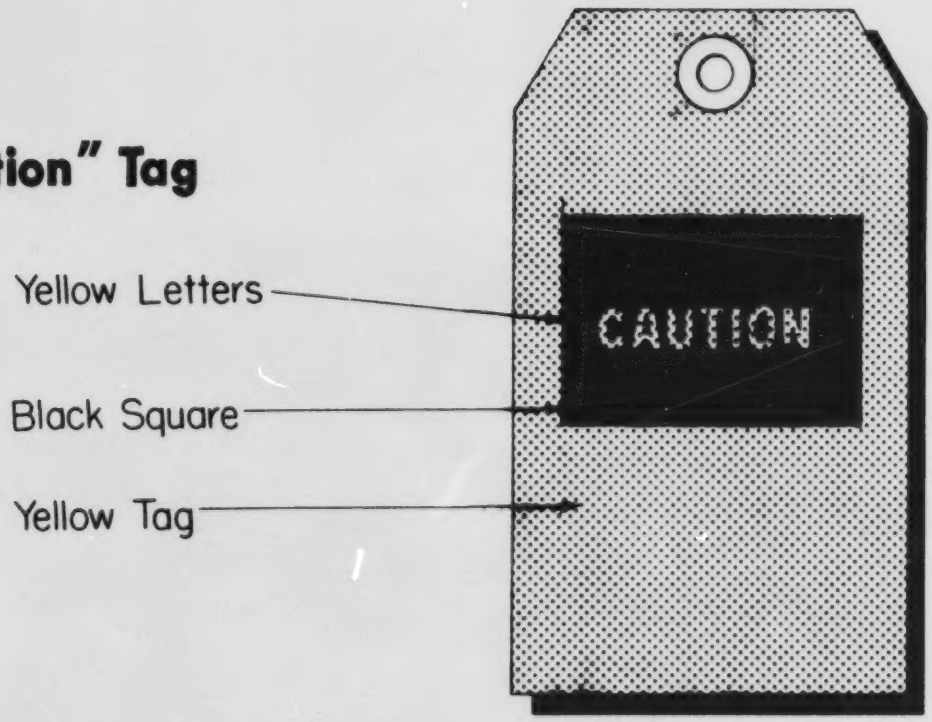


A10

"Out of Order" Tag



"Caution" Tag



Other uses of safety tags are marking defective ladders, dating maintenance and recharge of fire extinguishers and posting temporary lockouts on switches and equipment to be closed down while undergoing repair.

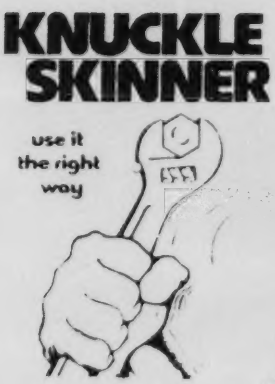
Safety Posters

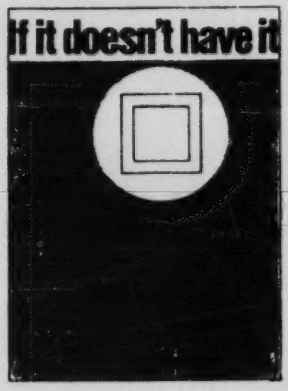
Posters and other commercially produced literature can be useful to shop instructors as attention-getters and as valuable teaching aids to emphasize safety practices. Bulletin boards can be a good place for displaying materials, but they must be rotated frequently for continued effectiveness. Posters can be obtained from a number of sources on request.

The following page contains only a few examples of hundreds of safety posters available.

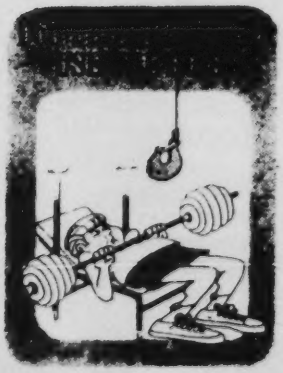
SEASONAL POSTERS

SHOP HOUSEKEEPING





TOOLS



MATERIALS HANDLING

Purchasing Signs, Tags and Posters

Perhaps the best source for purchasing safety posters is the National Safety Council's Poster Directory. Write the National Safety Council, 444 Michigan Avenue, Chicago, Illinois 60611 or, telephone on toll-free WATS line.

Signs and tags may be purchased from many of the safety product supply companies.

SOURCES OF SAFETY INFORMATION

The following are sources for a wide range of safety items, such as films, brochures, booklets and the like.

AAA Foundation for Traffic Safety
8111 Gatehouse Rd., Room 212
Falls Church, VA 22042

Abbott Laboratories
Professional Relations Department
Abbott Park
North Chicago, IL 60064

Academy of Medicine
Cleveland Poison Information Center
10525 Carnegie Ave.
Cleveland, OH 44106

Academy McLarty Productions, Inc.
207 Delaware Ave.
Buffalo, NY 14202

ACI Films, Inc.
35 West 45th St.
New York, NY 10036

Aetna Life and Casualty
151 Farmington Avenue
Hartford, CT 06115

Aims Instructional Media Service, Inc.
P. O. Box 1010
Hollywood, CA 90028

Airco Welding Products, Inc.
P. O. Box 799
Lexington, KY 40501

Allstate Enterprises, Inc.
Allstate Plaza F3
Northbrook, IL 60062

American Association of Motor
Vehicle Administrators
Suite 910
1201 Connecticut Ave., N.W.
Washington, DC 20036

American Bar Association
Traffic Court Program
1155 E. 60th St.
Chicago, IL 60637

American Dental Association
211 E. Chicago Ave.
Chicago, IL 60611

American Educational Films, Inc.
132 Lasky Drive
Berverly Hills, CA 90212

American Gas Association
1515 Wilson Boulevard
Arlington, VA 22209

American Film Productions, Inc.
1540 Broadway
New York, NY 10036

American Heart Association
Distribution Department
44 East 23rd St.
New York, NY 10010

American Honda Motor Co., Inc.
P. O. Box 50
100 Alondra Blvd.
Gardena, CA 90247

American Hospital Association
840 North Lake Shore Drive
Chicago, IL 60611

American Industrial Hygiene Association
14125 Prevost
Detroit, MI 48235

American Insurance Institute
85 John St.
New York, NY 10038

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535 Dearborn St.
Chicago, IL 60610

American Mutual Insurance Alliance
20 N. Wacker Dr.
Chicago, IL 60606

American National Red Cross
7th and D Streets
Washington, DC 20006

American National Standards Institute
1430 Broadway
New York, NY 10018

American Optical Corp.
Safety Products Division
Southbridge, MA 01550

American Petroleum Institute
1801 K St., N.W.
Washington, DC 20006

American Safety Belt Council
1730 Pennsylvania Ave., N.W.
Washington, DC 20006

American Society for Testing Materials
1916 Race St.
Philadelphia, PA 19103

American Society of Civil Engineers or
American Society of Mechanical Engineers
395 East 47th St.
New York, NY 10017

American Society of Safety Engineers
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Park Ridge, IL 60068

American Technical Society
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Chicago, IL 60637

American Telephone & Telegraph Co.
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New York, NY 10007

American Welding Society
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New York, NY 10017

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Marinette, WI 54143

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American Optical Co.
Southbridge, MA 01550

Applied Science Association
P. O. Box 158
Valencia, PA 16059

Area 16 Productions
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Hollywood, CA 90038

Argonaut Insurance Co.
250 Middlefield Rd.
Menlo Park, CA 94025

Associated Films Inc.
8615 Duertos Row
Dallas, TX 75247

Association Instructional Materials
866 Third Ave.
New York, NY 10022

Association of American Railroads
Safety Section
1920 L. Street, N.W.
Washington, DC 20036

Association of Mill & Elevator
Mutual Insurance Cos.
2 N. Riverside Plaza
Chicago, IL 60606

Association-Sterling Films
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New York, NY 10022

Atchison, Topeka & Santa Fe
Railway Co.
80 E. Jackson Blvd.
Chicago, IL 60604

Audience Planners
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Chicago, IL 60604

Audio Productions, Inc.
639 North Avenue
New York, NY 10036

Audio-Visual Center
Indiana University
Bloomington, IN 47401

Audio-Visual Services
Porter Building
University of Kentucky
Lexington, KY 40506

Australian Information Service
636 Fifth Ave.
New York, NY 10020

Automation in Housing
300 West Adams St.
Chicago, IL 60606

Bandelier Films, Inc.
2001 Gold Ave., S.E.
Albuquerque, NM 87106

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Film Distribution Service
635 St. Paul St.
Rochester, NY 14602

Bay State Film Productions, Inc.
Box 129
Springfield, MA 01101

Bete, Channing L. Co., Inc.
45 Federal St.
Greenfield, MA 01301

Better Vision Institute
230 Park Ave.
New York, NY 10017

BFA Educational Media
2211 Michigan Ave.
Santa Monica, CA 90404

Black and Decker
Modern Motion Picture Service
5060 Park St. North
St. Petersburg, FL 33709

Bowmar, Stanley Company
4 Broadway
Valhalla, NY 10595

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Audiovisial Division
North Brunswick, NJ 08902

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New York, NY 10020

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New York, NY 10036

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Los Angeles, CA 90049

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The Foredom Electric Co.
Route 6
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24 Rope Ferry Road
Waterford, CT 06385

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4800 Forbes Ave.
Pittsburg, PA 15213

Bureau of Safety
20 N. Wacker Dr.
Chicago, IL 60606

Business Education Films
5113 16th Ave.
Brooklyn, NY 11204

California Traffic Safety
Foundation
4111 Broadway
Oakland, CA 94611

Caterpillar Tractor Co.
Adm. Bldg. Adv. Div.
Peoria, IL 61602

Cavalcade Production, Inc.
St. Charles Road, Box 801
Wheaton, IL 60187

CCM Films
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Mount Vernon, NY 10550

California State Dept. of Education
Fiscal Office-Order Section
721 Capitol Mall
Sacremento, CA 95814

Cal-Central Press
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Sacramento, CA 95818

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Kansas City, MO 64106

Cassettes Unlimited
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Veterans Administration
Washington, DC 20420

Central Educational Films
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Lawrence, KS 66044

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Perry, OK 73077

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Ortho Division
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San Francisco, CA 94120

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New York, NY 10017

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Industrial Truck Division
Battle Creek, MI 49016

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Fort Myers Beach, FL 33931

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Atlanta, GA 30301

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4201 E. Arkansas Ave.
Denver, CO 80222

Commonwealth Edison Co.
Safety Section 72 W. Adams St.
Chicago, IL 60690

Compressed Gas Association
11 West 42nd St.
New York, NY 10036

Construction Safety Association
of Ontario
74 Victoria St.
Toronto, Ontario,
Canada M5C-2A5

Contemporary Films Inc.
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New York, NY 10001

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Chicago, IL 60601

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Minneapolis, MN 55404

CPT Film Lab
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Durham, NC 27703

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2323 4th St., N.E.
Washington, DC 20002

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Marina del Rey, CA 90291

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San Francisco, CA 94119

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Columbus, IN 47201

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Los Angeles, CA 90026

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1046 South Robertson Blvd.
Los Angeles, CA 90035

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San Francisco, CA 94104

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Industrial Education Catalog
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Defense Civil Preparedness Agency
Washington, DC 20301

Detroit Society for Prevention of Blindness
51 W. Warren Ave.
Detroit, MI 48201

Department of the Army
U. S. Army Agency for Aviation Safety
Fort Rucker, AL 36360

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New York, NY 10010

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90 Park Ave.
New York, NY 10016

Educational Film Distributors Ltd.
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Columbus, OH 43210

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Employers Insurance of Wausau
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Wausaw, WI 54401

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Chicago, IL 60611

External Information Department
IBM Corporation
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Jamaica, NY 11435

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Washington, DC 20036

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North Hollywood, CA 81601

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Atalnta, GA 30303

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1401 Ash
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National Safety Council
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Los Angeles, CA 90005

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Michigan Dept. of State
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Lansing, MI 48904

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Pittsburgh, PA 15213

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Timonium, MD 21093

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Chicago, IL 60611

Office of Emergency Services
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Toronto, Ontario, M4W-3C2
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Los Angeles, CA 90038

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Minneapolis, MN 55427

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B-376, Rayburn House Office Bldg.
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704 Santa Monica Blvd.
Santa Monica, CA 90401

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Des Plaines, IL 60018

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Carbondale, IL 62901

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Holyoke, MA 01040

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Glenview, IL 60025

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Seattle, WA 98119

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Arlington, VA 22209

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Sellstrom Industrial Park
Palatine, IL 60067

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One Market St., Room 304
San Francisco, CA 94105

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Pittsburgh, PA 15204

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Topeka, KS 66603

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Pulp and Paper Industry
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Atlanta, GA 30341

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Toronto 5, Ontario, Canada

Thor Power Tool Co.
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Aurora, IL 60507

3-M Company
Visual Productions Division
Box 3100A
Saint Paul, MN 55101

Trade and Industrial Education
State Department of Education
P. O. Box 2847
University of Alabama
Birmingham, AL 35203

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Travelers Film Library
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Fern-Tripp
2035 East Sierra Way
Dinuba, CA 93618

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Chicago, IL 60611

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Pittsburgh Film Distrib. Center
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Pittsburgh, PA 15230

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Motion Picutre Service
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Bureau of Labor Standards
Washington, DC 20210

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San Francisco Film Distribution Center
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U. S. Steel Corp., Geneva Works
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Media Center
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University of Iowa, East Hall
Iowa City, IA 52242

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416 Fourth St.
Ann Arbor, MI 48103

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Instructional Media Center
Nebraska Hall, 421
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Menomonie, WI 54751

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U. S. Postal Service
Motion Picture Branch - Rm. 11170
Washington, DC 20260

U. S. Public Health Service
Division of Emergency Health Services
Parklawn Building
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Rockville, MD 20852

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Washington, DC 20005

Visual Instruction Productions
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Visual Sciences
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Clemson, SC 29631

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Education Dept. 1-9700
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Dallas, TX 75222

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City Island
Bronx, NY 10464

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New York, NY 10017

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Motion Picture Bureau
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New York, NY 10038

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Xerox Films
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Zurich-American Insurance Co.
Film Department
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Chicago, ILL 60604

SOURCES OF SAFETY INFORMATION

DOCUMENTS AND SOURCES

Agency:
U. S. Department of Health and Human Resources
Public Health Service
Consumer Protection and Environmental Management
222 East Central Parkway
Cincinnati, Ohio 45202

Publication:
Demonstration Guide for Prevention of Electrical Shock Injury

Public Health Service. 1969. 54 pages. By illustrating and explaining basic facts particularly applicable to electricity, electrical systems, and electrical cords and appliances in the home, this demonstration guide is intended to prevent injuries associated with the misuse of electrical current.

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Publications:

Construction Safety, Site Clearing—Document No. VT 011 074

Safety in Industry Instructor Outline. Bulletin 302. Includes teaching aids and tips.

Find Your Way—Document No. VT 011 550

46 pages. This learning activity is intended to help the new student become familiar with the placement, purposes, uses, and safety rules of power equipment in the shop.

Handling Materials Safely—Document No. VT 011 622

Safety in Industry Instructor Outline. Bulletin 291. Includes teaching aids and tips.

Housekeeping for Safety—Document No. VT 011 624

Bulletin 295. Safety in Industry Instructor Outline. Includes teaching aids and tips.

Construction Safety, Pile Driving and Cofferdams—Document No. VT 011 692

Safety in Industry Instructor Outline. Bulletin 305. Includes teaching aids and tips.

Safety Handbook: A Guide for Industrial Arts Programs and Transparency Masters—Document No. VT 009 867

1969. 78 pages. Safety unit for junior and senior high industrial arts. First section covers safety material for both teacher and administrator; second section is a unit on general safety education.

Safety in Industrial Arts Laboratories—Document No. VT 011 775

Ralph V. Steeb and John J. Geil. May, 1969. 86 pages. Developed by industrial arts consultants to help the teacher develop within each student an awareness of safety that will be an aid to them in school, work and recreation.

Safety in Industry (Instructor Outline)—Document No. VT 011 422

Stanley J. Butcher. Department of Labor Safety Training Programs. 1970. 65 pages. An outline designed to aid in planning and presenting on-the-job industrial safety programs.

Safety in the Auto Shop—Document No. VT 011 497

Unit 1, lap. No. 1, Edgar Williams, et al, N.D. 18 pages. A learning activity package on safety in the high school auto shop. A self-instructional unit.

Safety, Your Concern and Mine—Document No. VT 011 495

Learning Activity Package, Safety in the Wood Shop. LAP No. 2 by R. M. Shreve. July, 1968. 20 pages. Describes safety rules for the high school wood shop. Covers also general safety rules.

Service Station Safety for Young Workers—Document No. VT 010 333

1965. 28 pages. Summarizes safe work habits for service station employees when lubricating a car, changing a tire, or checking the radiator.

Shop Safety—Document No. VT 010 686

1966. 38 pages. Workbook for student use in learning shop safety rules. Explanatory text and line drawings followed by questions which student must answer and check.

Use of Color for Safety—Document No. VT 011 626

Safety in Industry Instructor Outline. Bulletin 298. Includes teaching aids and tips.

Fundamentals of Accident Prevention—Document No. VT 011 343

Safety in Industry Organization and Administration Series. Outlines the basic elements which must be incorporated into every program of accident prevention if maximum results are to be obtained.

Illumination for Safety—Document No. VT 011 625

Safety in Industry Instructor Outline. Bulletin 297. Includes teaching aids and tips.

Industrial Arts Safety Checklist—Document No. VT 011 074

Washington State Department of Public Instruction. 1969. 16 pages. Will: (1) inform, educate, and remind people of what to look at; (2) train personnel to be observant; (3) provide a source of feedback to teachers and administrators and (4) provide a record of safety items and activities.

Mechanics for the Safety Man—Document No. VT 011 341

Safety in Industry, Mechanics and Physical Hazards. Applies the laws of mechanics to the daily work of preventing accidents. Bulletin 239.

Operating Engineers: First Course in Apprenticeship, Part I—Document No. VT 011 242

1965. 148 pages. Includes major study units on: (1) background of apprenticeship; (2) safety and first aid; (3) orientation to heavy equipment; and (4) planning reading and grade setting. Units divided into topics containing an introduction, related information, work assignments and 25 true-false questions.

Preventive Maintenance for Safety—Document No. VT 011 621

Safety in Industry Instructor Outline. Bulletin 290. Includes teaching tips, charts, and teaching aids.

Promoting Worker Interest in Safety—Document No. VT 011 617

Safety in Industry Instructor Outline. Bulletin 284. Includes teaching tips, planning procedures, charts and teaching aids.

Safe Working Surfaces—Document No. VT 011 623

Safety in Industry Instructor Outline. Bulletin 292. Includes teaching tips and aids.

Recommended Safe Practices for Gas-Shielded Arc Welding—Document No. VT 011 980

1966. 16 pages. Discusses the potential hazards associated with the gas shielded arc welding process and gives recommended control measures.

Rigging and Safety for Apprentice Training in the Plumbing and Pipe Fitting Industry—Document No. VT 010 015

D. Bart Phipps, August, 1955. 48 pages. Contains instructional material on rigging and safety. Part of apprenticeship training for plumbing and pipe fitting industry.

Safe Practice for Welding and Cutting Containers that have Held Combustibles—Document No. VT 011 978

1965. 21 pages. Intended as a safe practices guide for persons who weld or cut containers that have held combustibles.

OFFICES OF THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION

Office of Information Services
Occupational Safety and Health Administration
U. S. Department of Labor
Washington, D. C. 20210

Regional Administrator
Occupational Safety and Health Administration
1375 Peachtree Street N.W.
Suite 587
Atlanta, Georgia 30309 (404 526-3573)

These documents can be obtained from the Occupational Safety and Health Administration.

The Target Health Hazards, OSHA 2051

Trenching and Excavation—A Checklist, OSHA 2089

Selected Publications, OSHA 2019

Job Safety and Health, OSHA 2058

All About OSHA, OSHA 2056

Questions and Answers to Part 1910, OSHA 2095 Department of Labor

15 Questions, OSHA 2087

Know the Answers
Help Prevent Cave-ins

Excavating, Trenching and Backfilling, OSHA 2086

Inspection, OSHA 2026

Dangerous Cargo Labels, 1968: 0-321-482

Guidelines for Setting up Job Safety and Health Programs, OSHA 2072

The Target Industries, OSHA 2034

Profiles of Five Hazardous Occupations

Training Requirements of the Occupational Safety and Health Standards, OSHA 2082

The Principles and Techniques of Mechanical Guarding, OSHA 2057

General Industry Guide for Applying Safety and Health Standards, OSHA 2072

29CFR 1910

PUBLICATIONS FROM NIOSH

The following are publications from the National Institute for Occupational Safety and Health (NIOSH), Office of Public Information Room 10-A022, 5600 Fishers Lane, Rockville, Maryland 20852:

Kit of Basic NIOSH Reference Materials

Basic materials concerning the Occupational Safety and Health Act of 1970 and the NIOSH program. Contains article reprints, fact sheets and related materials.

Films and Filmstrips on Occupational Safety and Health

Listing of occupational safety and health films and filmstrips compiled to provide interested individuals and groups with a current reference to loan-free audio-visual aids. Includes a listing of organizations that offer rental and purchase occupational safety and health audio-visual aids.

Working with Industrial Solvents

8 pages. For use by workers using organic industrial solvents. Pamphlet includes a discussion of the nature of solvents, health problems, control of exposure, and the actions of employers and employees.

Welding Safely

8 pages. Information pamphlet for welders. Discusses the health aspect of welding operations. Pamphlet includes a discussion of health hazards, control methods, and possible actions by management and workers.

Job Safety and Health Services

4 pages. Discusses the services NIOSH can offer to private industry and other government agencies and where these services can be obtained.

Working with Cutting Fluids

5 pages. Discusses what cutting fluids are, how they are used, how they may affect the worker, and methods for control.

Directory of Governmental Occupational Safety and Health Personnel

Annual listing of local, state and Federal agencies engaged full- or part-time in occupational safety and health activities.

A Learning Experience in Occupational Safety and Health

12 pages. Course listing for NIOSH's Division of Training for June 1973-July 1974.

The President's Report on Occupational Safety and Health

A report on the year's progress by the Department of Labor (OSHA) and the Department of Health, Education and Welfare (NIOSH) in implementing the Occupational Safety and Health Act of 1970. Available in single copies only.

Annual Report of the Federal Coal Mine Health and Safety Act

This annual report describes the activities of NIOSH (DHEW) in carrying out health responsibilities under the Federal Coal Mine Health and Safety Act of 1969.

Training Grants

Describes NIOSH supported training grant programs underway in colleges and universities across the nation.

On-the-Job Safety Rules for Power Tools

4 pages. A joint publication by the Power Tool Institute, Inc., National Association of Home Builders, the United Brotherhood of Carpenters and Joiners of America and NIOSH. Presents through drawings and narration the rules for power tool use in occupational settings.

Protecting the Health of Coal Miners—An Interagency Approach

17 pages. Describes the liaison arrangements of NIOSH and the Bureau of Mines and the principal health protective measures of the Act (respirable dust standards). A review of compensation features of Title IV for disabled miners and their survivors is also presented.

Criteria for a Recommended Standard—Occupational Exposure to Carbon Monoxide

124 pages. Recommends control of worker exposure to carbon monoxide. GPO Order No. 1733 00007, $2.00 each. NTIS Order No. PB 212629, $3.00 each, microfiche, 95¢.

Criteria for a Recommended Standard—Occupational Exposure to Noise

152 pages. Recommends control of worker exposure to noise. GPO Order No. 1733 00007, $2.00 each. NTIS Order No. PB 213563, $3.00 each, microfiche, 95¢.

Annual List of Toxic Substances—1972

572 pages. A listing of potentially hazardous materials. Serving as a guide for research needed in setting new occupational health standards. Publication required annually by the Occupational Safety and Health Act of 1970. GPO Order No. 1719 00006, $6.00 each.

National Safety Council

Alphabetical Index

June 1981

Industrial Safety Data Sheets

NOTE: This index is by subject. Some Data Sheets are under as many as three subject headings. Be sure to check Data Sheet numbers to eliminate any duplication before ordering. Data Sheet revisions published between January 1968 and December 1975 are designated by a suffix letter ("A," "B," etc.) to designate successive revisions. Data Sheets published after January 1976 are listed with their year of publication.

— A —

Abrasive Blasting . . . 433A
Abrasives, Coated . . . 452B
Accident Records and Analysis, Work . . . 527B
Accident Records, Off-the-Job (1978) . . . 601
Acetic Acid (1979) . . . 410
Acetone (1977) . . . 396
Acetonitrile (1981) . . . 683
Acetylene (1977) . . . 494
Acid Plant, The . . . 210
Acidizing, Safe Well Stimulation (1979) . . . 634
Acrolein (1978) . . . 436
Adipic Acid (1977) . . . 438
Aerial Baskets . . . 572
Air Compressors & Air Receivers, Cleaning (1978) . . . 379A
Air Powered Hand Tools (1978) . . . 392
Airport Vehicular Traffic (1977) . . . 539
Alcohol, Industrial Ethyl . . . 391
Alligator Shears . . . 213
Aluminum Chloride (Anhydrous) (1978) . . . 435
Ammonia (Anhydrous) (1979) . . . 251
Ammonium Nitrate/Fuel Oil Mixtures as Blasting Agents (1977) . . . 536
Ammonium Nitrate/Fuel Oil Mixtures in Underground Mines (1977) . . . 604
Amyl Acetate (1977) . . . 208
Aniline (1979) . . . 409
Animal Wastes, Disposal of Potentially Contaminated (1979) . . . 679
Antimony and Its Compounds (1978) . . . 408
Arc Welding (Gas-Shielded) & Plasma Jets . . . 552
Arsenic and Its Inorganic Compounds (1979) . . . 499
Asphalt . . . 215
Asphalt Roofing Manufacture . . . 582
Atmospheres in Sub-Surface Structures and Sewers (1979) . . . 550
Audio-Visuals (*see* Visual Aids)
Automotive Hoisting Equipment (1979) . . . 437

— B —

Bale Opening and Cotton Cleaning (1979) . . . 520
Baling Presses (1977) . . . 666
Ballers, Scrap . . . 611
Band Saws, Woodworking . . . 235
Barricades and Warning Devices For Highway Construction Work . . . 239B
Baskets, Aerial . . . 572
Batteries, Lead-Acid Storage (1979) . . . 635
Beamers, Warpers and (1977) . . . 487

SEE BACK PAGE FOR ORDERING INFORMATION ■

Benzene (Benzol) (1979) . . . 306
Berms in Pits and Quarries (1979) . . . 660
Beryllium . . . 562A
Beta Particle Sealed Sources (1976) . . . 461
Billets and Bars, Cold Shearing . . . 557
Billets and Bars, Pickling of . . . 469
Bituminous Pavement Patching and Repairing . . . 647
Blasting, Abrasive . . . 433A
Blasting, Electric (*see* Explosives)
Blowtorches and Plumbers' Furnaces (1979) . . . 470
Boring Mills, Horizontal Metal . . . 289A
Boring Mills, Vertical Metal (1979) . . . 347
Boring, Raise (Mining Industry) (1977) . . . 599
Boron Hydrides (1979) . . . 508
Bottles and Broken Glass (1978) . . . 355
Brakes, Press (1977) . . . 419
Brazing, Hand Soldering and (1978) . . . 445
Bridge Painting . . . 296A
Bromine (1979) . . . 313
Brush Cutting Tools (1978) . . . 427
Bulk First Aid Kits . . . 651
Bulldozers, Graders, and Scrapers . . . 258A
Buoyant Work Vests . . . 626
Burns, Chemical . . . 523

— C —

Cables (Utility), Direct-Buried . . . 607
Cadmium (1978) . . . 312
Calender and Mill Rescue Methods . . . 509
Calender Roll Bites, Guarding (1978) . . . 449
Calender Rolls, Handling . . . 403
Carbolic Acid (Phenol) (1978) . . . 405
Carbon Bisulfide (Carbon Disulfide) (1977) . . . 341
Carbon Dioxide (1980) . . . 682
Carbon Monoxide (1976) . . . 415
Carbon Tetrachloride (1979) . . . 331
Cards, Cotton (1979) . . . 227
Cards, Woolen and Worsted (1976) . . . 295
Care and Inspection of Wire Rope . . . 667
Cathode-Ray Tubes . . . 240A
Caustic Liquor Room, The . . . 214
Caustic Soda (1976) . . . 373
Ceiling and Rooftop Appliances, Servicing . . . 646
Centrifuges . . . 591
Chain Saws, Portable Power . . . 320A
Chains (Alloy Steel) for Overhead Lifting (1977) . . . 478

Chemically Related (*see also* Explosives *and* Fire)

Acid Plant, The . . . 210
Caustic Liquor Room, The . . . 214
Centrifuges . . . 591
Chemical Burns . . . 523
Cleaning Compounds Used in Meat Packing (1979) . . . 593
Combustible Metals, Fire Protection (1979) . . . 567
Combustibles, Cleaning Small Containers of (1978) . . . 432
Cryogenic Fluids in The Laboratory (1980) . . . 688
Cutting Oils, Emulsions & Drawing Cmpds. (1977) . . . 501
Dusts, Fumes, and Mists in Industry (1980) . . . 531
Flammable Liquids in Small Containers (1976) . . . 532
Rubber Cement, Spreading . . . 334A

Chemicals (*see also* Chemically Related)

Acetic Acid (1979) . . . 410
Acetone (1977) . . . 398
Acetonitrile (1981) . . . 683
Acetylene (1977) . . . 404
Acrolein (1978) . . . 436
Adipic Acid (1977) . . . 438
Aluminum Chloride (Anhydrous) (1978) . . . 435
Ammonia (Anhydrous) (1979) . . . 251
Ammonium Nitrate/Fuel Oil Mixtures as Blasting Agents (1977) . . . 536
Ammonium Nitrate/Fuel Oil Mixtures in Underground Mines (1977) . . . 604
Amyl Acetate (1977) . . . 208
Aniline (1979) . . . 409
Antimony and Its Compounds (1978) . . . 408
Arsenic and Its Inorganic Compounds (1979) . . . 499
Asphalt . . . 215
Benzene (Benzol) (1979) . . . 306
Beryllium . . . 562A
Boron Hydrides (1979) . . . 508
Bromine (1979) . . . 313
Cadmium (1978) . . . 312
(Carbolic Acid) Phenol . . . 405
Carbon Bisulfide (Carbon Disulfide) (1977) . . . 341
Carbon Dioxide (1980) . . . 682
Carbon Monoxide (1976) . . . 415
Carbon Tetrachloride (1979) . . . 331
Caustic Soda (1976) . . . 373
Chlorates (1977) . . . 371
Chlorine (1979) . . . 207
Chlorine Dioxide . . . 525
Dichloromethane (Methylene Chloride) (1979) . . . 474
Dinitrotoluene (1976) . . . 658
Epoxy Resin Systems . . . 533B
Ethyl Alcohol, Industrial . . . 391
Ethyl Ether (Diethyl Oxide) . . . 396
Ethylene Dichloride (1977) . . . 350
Ethylene Oxide (1980) . . . 689
Fluorides, Inorganic . . . 442A
Formaldehyde (1979) . . . 342
Hydraulic Fluids (1978) . . . 471
Hydraulic Fluids, Fire Resistant Water-in-Oil (1979) . . . 543
Hydrofluoric Acid (1978) . . . 469
Hydrogen Sulfide (1977) . . . 284
Iodine . . . 457A
Isocyanates (TDI and MDI) (1977) . . . 489
Lead . . . 443A
Lime . . . 241A
Liquefied Petroleum Gases for Industrial Trucks . . . 479B
Lithium (1978) . . . 506
Magnesium . . . 428A
Manganese . . . 306A
Mercury (1976) . . . 203
Mercury, Fulminate of (1978) . . . 309
Metal Hydrides (1979) . . . 462
Methanol . . . 407
Methylene Chloride (Dichloromethane) (1979) . . . 474
Naphthalene (Crude and Refined) (1978) . . . 370
Nitrate-Nitrite Salt Baths for Heat Treating (1979) . . . 270
Oxalic Acid (1978) . . . 406
Oxygen, Gaseous (1977) . . . 472
Perchloric Acid . . . 311A
Perchloroethylene (1978) . . . 673
Peroxidizable Compounds (1976) . . . 655
Phenol (Carbolic Acid) (1978) . . . 405
Phosphorus, White . . . 282B
Picric Acid (1979) . . . 351
Pyridine (1978) . . . 310
Selenium and Its Compounds (1977) . . . 578
Sodium (1978) . . . 231
Styrene Monomer (1976) . . . 627
Sulfur, Handling and Storage of Solid (1979) . . . 612
Sulfur, Handling Liquid (1979) . . . 592
Sulfuric Acid (1977) . . . 325
Tetryl (1979) . . . 218
Trichloroethylene (1979) . . . 389
Trinitrotoluene (TNT) . . . 314A
Turpentine . . . 367A
Xylene and Toluene . . . 204
Zinc and Zinc Oxide (1978) . . . 267
Zirconium Powder . . . 382A

Chippers and Hogs . . . 602
Chlorates (1977) . . . 371
Chlorine (1979) . . . 207
Chlorine Dioxide . . . 525

Cleaning (*see* Industrial Hygiene)

Cleaning Compounds (Meat Packing Industry) (1979) . . . 593
Cleaning Machinery and Electric Motors . . . 285
Climbers (Linemen's), Care of (1978) . . . 620
Climbing Devices and Fixed Ladders . . . 606A
Clippers, Veneer . . . 542
Cloth Shearing Machines (1978) . . . 609
Cold-Room Testing of Gasoline & Diesel Engines . . . 465
Combustible Metals, Fire Protection for (1979) . . . 567
Combustibles, Cleaning Small Containers That Have Held (1978) . . . 432
Committees, Safety . . . 631
Compression & Transfer Molding of Plastics (1978) . . . 632
Concrete Construction, Lift-Slab . . . 514A
Concrete Construction, Tilt-Up (1978) . . . 513
Concrete Formwork, Vertical Shoring of (1981) . . . 628
Concrete, Paving With Portland Cement . . . 541A
Concrete, Prestressed (Yard Operations) (1979) . . . 629
Concrete Trucks, Ready Mixed (1976) . . . 617

Construction (*see also* Mining and Quarrying)
Accident Records and Analysis, Work . . . 527A
Acetylene (1977) . . . 494
Aerial Baskets . . . 572
Asphalt . . . 215
Atmospheres in Subsurface Structures and Sewers (1979) . . . 560
Barricades & Warning Devices for Highway Construction Work . . . 238B
Berms in Pits and Quarries (1979) . . . 553
Blowtorches and Plumbers' Furnaces (1979) . . . 470
Buoyant Work Vests . . . 626
Chains (Alloy Steel) for Overhead Lifting (1977) . . . 478
Climbing Devices and Fixed Ladders . . . 606A
Concrete, Prestressed, Yard Operations . . . 629
Concrete Formwork, Vertical Shoring . . . 628
Cranes, Electric Shovels and other Mobile Equipment, Grounding (1979) . . . 287
Cranes, Tower . . . 630
Demolition Balls . . . 476
Drinking Water on Construction Jobs . . . 398A
Electromagnets Used with Crane Hoists (1977) . . . 359
Excavation, General (1978) . . . 482
Excavation, Trench (1978) . . . 254
Fire Protection and Control on Construction Sites (1977) . . . 491
Fixed Ladders and Climbing Devices . . . 606A
Grounding of Cranes, Electric Shovels, and Similar Equipment (1979) . . . 287
Helicopters (Externally-Loaded) In Construction . . . 649
Hoists, Construction Material . . . 511B
Hot Work Permits (Flame or Spark) . . . 522
Insulated Flexible Protective Equipment for Electrical Workers (1980) . . . 598
Job-Made Ladders (1978) . . . 568
Ladders, Portable (1977) . . . 665
Lift-Slab Concrete Construction . . . 514A
Medical Services at Construction Site . . . 640
Motor Graders, Bulldozers and Scrapers . . . 258A
Motor Trucks for Mines, Quarries and Construction (1977) . . . 330
Pavement Marking of Streets, Roads and Highways . . . 643
Pavement Patching and Repairing, Bituminous . . . 647
Paving with Portland Cement Concrete . . . 541A
Portable Ladders (1977) . . . 665
Power Shovels, Draglines, and Similar Equipment, Operation of . . . 271
Protection of Explosives from Theft . . . 648
Ready Mixed Concrete Trucks (1976) . . . 617
Safety Hats . . . 581A
Safety Nets for Construction Projects . . . 608A
Saws, Masonry (Stationary, Single-Blade Type) . . . 506A
Shoring (Vertical) of Concrete Formwork (1981) . . . 628
Sidewalk Sheds (1979) . . . 368
Silicon Diode Grounding Devices (1979) . . . 581
Slings (Manila Rope), Safe Use of . . . 259
Slings (Wire Rope), Recommended Loads for . . . 390A
Steel Plates, Handling for Fabrication . . . 565
Surveying, Surface . . . 614A
Tilt-Up Concrete Construction (1978) . . . 513
Tools, Live Line . . . 498A
Tractor Operation and Roll-over Protective Structures (1978) . . . 622
Trench Excavation (1978) . . . 254
Utility Cable, Direct-Buried . . . 607
Wiring for Temporary Use on Construction Sites (1980) . . . 515
Containers (Small) of Combustibles, Cleaning (1978) . . . 432
Containers, Flammable Liquids in Small (1976) . . . 532
Continuous Digesters . . . 645
Conveyors, Belt (for Bulk Material)—Equipment (1978) . . . 569
Conveyors, Belt (for Bulk Material)—Operation . . . 570A
Conveyors, Roller (1979) . . . 528
Conveyors, Underground Belt (1978) . . . 447
Corrugators (1977) . . . 356
Cotton Cards (1979) . . . 227
Cotton Cleaning and Bale Opening (1979) . . . 520
Cotton Gins (1976) . . . 530
Cotton Slashers and Auxiliaries (1977) . . . 223
Crane Hoists, Electromagnets Used With (1977) . . . 359
Cranes and Mobile Equipment, Grounding (1979) . . . 287
Cranes, Pendant-Operated and Radio Console-Controlled (1978) . . . 558
Cranes, Tower . . . 630
Cryogenic Fluids in the Laboratory (1980) . . . 688
Curing (Tire), Automatic Press Operations . . . 625A
Curing (Tire & Tube), Manual & Semiautomatic . . . 305A
Cutting and Clearing Vegetation (1976) . . . 575
Cutting Oils, Emulsions, and Drawing Cmpds. (1977) . . . 501

— D —

Degreasers, Vapor . . . 429A
Degreasing (Liquid) of Small Metal Parts (1977) . . . 537
Demolition Balls . . . 476
Dermatitis, Occupational (1981) . . . 510
Detecting and Supporting Loose Rock or Ore Underground (1978) . . . 378
Devulcanizers (Rubber Industry) . . . 554
Dichloromethane (Methylene Chloride) (1979) . . . 474
Die Casting Machines (1977) . . . 266
Dies, Forging Hammer, Setup and Removal of . . . 467
Dies, Power Press, Setting Up and Removing (1976) . . . 211
Dies, Removing Piece Parts in Mechanical Power Presses (1981) . . . 534
Digesters, Continuous . . . 645
Digesters, Pulp Mill . . . 340A
Diode Grounding Devices, Silicon (1979) . . . 581
Dinitrotoluene (1976) . . . 658
Disposal of Potentially Contaminated Animal Wastes (1979) . . . 679
Diving in Construction Operations . . . 555
Dock Plates and Gangplanks . . . 318A
Draglines, Power Shovels and Similar Equipment, Operation of . . . 271
Drawing Cmpds., Emulsions and Cutting Oils (1977) . . . 501
Drill Presses, Metal-Working (1977) . . . 335
Drilling in Open-Pit Mines (1977) . . . 573
Drilling (Jumbo) of Rock (1979) . . . 538
Drills, Jack Leg . . . 504
Drills, Portable Reamer (1979) . . . 497
Drinking Water on Construction Jobs . . . 399A
Dusts, Fumes, and Mists in Industry (1980) . . . 531

— E —

Edgers, Sawmill . . . 571A
Electric Blasting, Treatment of Extraneous Electricity in . . . 644
Electric Cords and Fittings (1979) . . . 385
Electric Equipment, Grounding (1980) . . . 684
Electric Motors and Machinery, Cleaning . . . 285A
Electric Motors for Hazardous Locations, Maintenance of (1978) . . . 546
Electric Shovels, Cranes and Other Mobile Equipment, Grounding (1979) . . . 287
Electrical Equipment and Lighting (*see also* Electricity; Hand Tools; *and* Protective Equipment)
Auxiliary Electrical Systems and Emergency Lighting . . . 248A
Cable, Direct-Buried Utility . . . 607
Cathode Ray Tubes . . . 240A
Electric (Extension) Cords and Fittings (1979) . . . 385
Electric Plug and Receptacle Configurations . . . 579A
Electric Switches, Methods of Locking Out (1978) . . . 237
Electrical Controls for Power Presses . . . 624A
Electrical Safety in Health Care Facilities (1976) . . . 660
Electrical Switching Practices (1978) . . . 544
Electrical Testing Installations . . . 641
Equipment Grounding (1980) . . . 684
Extension Light Cords and Systems, Low Voltage . . . 316A
Flexible Insulated Protective Equipment for Electrical Workers (1980) . . . 598
Ground Fault Circuit Interrupters for Personnel Protection . . . 638
Grounding Devices, Silicon Diode (1979) . . . 581
Grounding Electric Shovels, Cranes and other Mobile Equipment (1979) . . . 287
Industrial Electric Substations . . . 559
Linemen's Climbers, Care and Maintenance of . . . 620A
Live Line Tools . . . 498A
Storage Batteries, Lead-Acid (1979) . . . 635
Ultra-Sonic Non-Destructive Testing for Metals (1976) . . . 662
Underground Residential Distribution of Electricity (1976) . . . 657
Wiring for Temporary Use on Construction Sites (1980) . . . 515
Electricity, Energy, and Heat (*see also* Electrical Equipment *and* Fire)
Beta Particle Sealed Sources (1976) . . . 461
Electricity (Extraneous) in Electric Blasting, Treatment of . . . 644
Heat Control, Radiant . . . 381A
Heating, Radio Frequency (1978) . . . 319
Heat Treating, Nitrate-Nitrite Salt Baths for (1979) . . . 270
Static Electricty (1979) . . . 547
Storage Batteries, Lead-Acid (1979) . . . 635
X-Rays in Industry (1976) . . . 475
Electrical Safety in Health Care Facilities (1976) . . . 660
Electrical Switching Practices (1978) . . . 544
Electrical Testing Installations . . . 641

Electromagnets Used With Crane Hoists (1977) . . . 359
Emergency Showers and Eyewash Fountains (1980) . . . 686
Emulsions, Cutting Oils & Drawing Cmpds (1977) . . . 501
Energy (*see* Electricity, Energy, and Heat)
Engine Lathes . . . 264A
Engines (Diesel and Gasoline), Cold Room Testing of . . . 485
Entry Into Grain Bins and Food Tanks (1977) . . . 663
Epoxy Resin Systems . . . 533B
Equipment Grounding (1980) . . . 684
Escalators . . . 518A
Ethyl Alcohol, Industrial . . . 391
Ethyl Ether (Diethyl Oxide) . . . 396
Ethylene Dichloride (1977) . . . 350
Ethylene Oxide (1980) . . . 689
Evacuation System for High-Rise Buildings (1981) . . . 656
Excavation, General (1978) . . . 482
Excavation, Trench (1978) . . . 254
Exhaust Systems, Checking Performance of (1977) . . . 428
Exhaust Ventilation Systems, Instruments for Testing (1980) . . . 431
Explosives (*see also* Fire *and* Chemicals)
Ammonium Nitrate/Fuel Oil Mixtures as Blasting Agents (1977) . . . 536
Ammonium Nitrate/Fuel Oil Mixtures in Mines (1977) . . . 604
Electric Blasting, Treatment of Extraneous Electricity in . . . 644
Fulminate of Mercury (1978) . . . 309
Fusees and Torpedoes (Railroad), Handling and Storage . . . 639
Protection of Explosives from Theft . . . 648
(Extension) Cords and Fittings, Electric (1979) . . . 385
Extension Light Cords and Systems, Low Voltage . . . 318A
Externally Loaded Helicopters in Construction Work . . . 649
Extruders and Strainers (Rubber and Plastics Industry) (1978) . . . 610

—F—

Falls Through Openings in Mines, Prevention of (1978) . . . 387
Falls on Floors (1981) . . . 495
Fertilizer Industry, Storage and Handling of Phosphoric Acid in (1978) . . . 674
Fire Protection (*see also* Chemicals; Explosives; *and* Industrial Hygiene)
Cleaning Small Containers That Have Held Combustibles (1978) . . . 432
Fire Brigades (1978) . . . 588
Fire Prevention and Control on Construction Sites (1977) . . . 491
Fire Prevention in Stores (1978) . . . 549
Fire Protection for Combustible Metals (1979) . . . 567
Fire-Resistant Water-in-Oil Emulsion Hydraulic Fluids (1979) . . . 543
Flammable Liquids in Small Containers (1978) . . . 532
Hot Work Permits . . . 522A
Firearms for Plant Protection (1977) . . . 413
First Aid (*see* Medical)
First Aid Kits, Bulk . . . 651
First Aid Kits, Unit (1980) . . . 202
Flammable Liquids in Small Containers (1978) . . . 532
Floor Mats and Runners (1981) . . . 595
Floors, Falls On . . . 495
Fluorides, Inorganic . . . 442A
Food Tanks, Entry into Grain Bins and (1977) . . . 663
Forging Hammer Dies, Set Up & Removal . . . 467
Forging Presses, Mechanical . . . 560
Forklifts (Industrial Lift Trucks) (1977) . . . 653
Formaldehyde (1979) . . . 342
Formwork (Concrete), Vertical Shoring (1981) . . . 628
Freight Car Doors . . . 374A
Front-End Loaders (1977) . . . 589
Fulminate of Mercury (1978) . . . 309
Fumes, Dusts, and Mists in Industry (1980) . . . 531
Fusees and Torpedoes — Used in Railroad Operations, Handling and Storage of . . . 639

—G—

Gangplanks and Dock Plates . . . 318A
Gantry Trucks . . . 257
Garnetting Machines (1976) . . . 366
Gas-Shielded Arcs and Plasma-Jet Torches . . . 552
Gas Systems, Pressurized (Aerospace Industries) . . . 590
Gauging and Sampling (Manual) of Petroleum Tanks (1979) . . . 583
Gear-Hobbing Machines (1977) . . . 362
Glass (Broken) and Bottles (1978) . . . 355
Glass Furnace Repair . . . 455A
Graders, Bulldozers, and Scrapers . . . 256A
Grain Bins and Food Tanks, Entry into (1977) . . . 663
Grain, Unloading Bulk From Boxcars (1979) . . . 521
Grinders, Portable . . . 583A
Ground-Fault Circuit Interrupters . . . 636
Grounding (*see* Electrical)
Grounding Electric Shovels, Cranes, and other Mobile Equipment (1979) . . . 287
Guarding Calender Roll Bites (Rubber Industry) (1978) . . . 449

—H—

Hammer Dies, Setup and Removal of Forging . . . 467
Hammers, Steam Drop . . . 450
Hand Tools (*see also* Saws)
Abrasives, Coated . . . 452B
Air Powered Hand Tools (1978) . . . 392
Brush Cutting Tools (1978) . . . 427
Drills, Jack Leg . . . 504
Drills (Reamer), Portable (1979) . . . 497
Grinders, Portable . . . 583A
Knives, Hand . . . 389
Live Line Tools . . . 498A
Powder Actuated Hand Tools (1979) . . . 236
Pulpwood, Tools for Manual Handling . . . 292
Reamer Drills, Portable (1979) . . . 497
Soldering and Brazing, Hand (1978) . . . 445
Hand Trucks, Powered . . . 317A
Hatch Boards and Beams, Handling (1977) . . . 661
Hats, Safety . . . 561A
Head Rigs, Sawmill . . . 460
Heat (*see* Electricity, Energy, *and* Heat)
Highway Construction, Barricades and Warning Devices for . . . 239B
Highway Signs and Markers (1976) . . . 659
Highways, Snow and Ice Control . . . 638
Highways, Streets, and Roads, Pavement Marking of (1976) . . . 643
Hogs and Chippers . . . 602
Hoisting Equipment, Automotive (1979) . . . 437
Hoists, Construction Material . . . 511B
Hoists (Crane), Electromagnets Used with (1977) . . . 359
Hot Work Permits (Flame or Spark) . . . 522A
Hydraulic Fluids (1978) . . . 471
Hydraulic Fluids, Fire-Resistant, Water-in-Oil Emulsion (1979) . . . 543
Hydrides, Boron (1979) . . . 508
Hydrides, Metal (1979) . . . 462
Hydrofluoric Acid (1978) . . . 459
Hydrogen Sulfide (1977) . . . 284

—I—

Ice and Snow Control on Highways . . . 638
Industrial Hygiene and Cleaning (*see also* Chemicals; Fire; Medical; *and* Protective Equipment)
Blasting, Abrasive . . . 433A
Bottles and Broken Glass . . . 355A
Brush Cutting Tools (1978) . . . 427
Cleaning Air Compressors & Air Receivers (1978) . . . 379
Cleaning Compounds Used in the Meat Packing Industry (1979) . . . 593
Cleaning, High Pressure Water (1977) . . . 633
Cleaning Machinery and Electric Motors . . . 285A
Cleaning, Sewer Pipe . . . 577
Cleaning Small Containers That Have Held Combustibles (1978) . . . 432
Cleaning With Hot Water and Steam . . . 238A
Coatings for Water Pipes, Valves, & Fittings, Applications for Protective (1979) . . . 613
Degreasing (Liquid) of Small Metal Parts (1977) . . . 537
Degreasing, Vapor . . . 429A
Drinking Water on Construction Jobs . . . 399A
Dusts, Fumes, and Mists in Industry . . . 531A
Emergency Showers and Eyewash Fountains (1980) . . . 686
Exhaust Systems (Local), Checking Performance of (1977) . . . 428

Exhaust Ventilation Systems, Instruments for Testing . . . 431
Falls Down Mines, Prevention of . . . 397A
Falls on Floors (1981) . . . 495
Floor Mats and Runners . . . 595
Noise Suppression in Mines (1976) . . . 615
Occupational Dermatitis (1981) . . . 510
Paint Spraying and Detearing, Electrostatic . . . 498A
Radiant Heat Control . . . 361A
Reflecting and Luminescent Material . . . 245A
Refuse Collection in Municipalities . . . 618
Rubber Cement, Spreading . . . 334A
Sound Levels in the Glass Industry, Evaluation and Control of . . . 652
Subsurface Structures and Sewers, Atmospheres in (1979) . . . 550
Tree Trimming (1978) . . . 344
Vegetation, Cutting and Clearing (1976) . . . 575
Vessel Entry (Rubber Industry) . . . 458A
X-Rays in Industry (1976) . . . 475
Injection Molding of Plastics (1978) . . . 454
Inorganic Fluorides . . . 442
Insulating Protective Equipment, Flexible . . . 596
Interrupters, Ground-Fault Circuit . . . 636
Iodine . . . 457A
Isocyanates (TDI and MDI) (1977) . . . 489

— J —

Jack Leg Drills . . . 504
Jointers, Wood . . . 280A
Jumbo Drilling of Rock (1979) . . . 538

— K —

Kick (Foot) Presses . . . 363A
Kitchen Machines (1978) . . . 545
Knives, Hand . . . 369

— L —

Laboratories, Working Alone in R & D (1978) . . . 670
Laboratory Fume Hoods (1980) . . . 687
Laboratory Oven Safe Practices (1978) . . . 681
Ladders (Fixed) and Climbing Devices . . . 606A
Ladders, Job-Made (1976) . . . 568
Ladders, Portable (1977) . . . 665
Lathes, Engine . . . 264A
Lathes, Wood Turning . . . 253A
Lawn Mowers, Power (1977) . . . 464
Lead . . . 443A
Letoffs and Windups (Rubber Industry) . . . 518
Lift-Slab Concrete Construction . . . 514A
Lift Trucks, Powered Industrial (1978) . . . 653
Light Cords (Extension), Low Voltage . . . 316A
Lighting (see Electrical)
Lighting, Auxiliary Electrical Systems and Emergency . . . 248A
Lime . . . 241A
Linemen Climbers, Care and Maintenance of . . . 620A
Lining Tanks and Vessels With Rubber (1977) . . . 492
Lithium (1978) . . . 566
Liquefied Petroleum Gases for Industrial Trucks . . . 479B
Liquids, Flammable in Small Containers (1978) . . . 532
Live Line Tools . . . 498A
Load Dividers in Damage-Free (D/F) Railroad Cars . . . 650
Load-Haul-Dump Machines in Underground Mines (1977) . . . 576
Loaders, Front-End (1977) . . . 589
Loading Machines, Rocker Type, Safe Operation of (1977) . . . 209
Locking Out Electric Switches (1978) . . . 237
Log Preparation for Veneer Peeling . . . 642
Log Skidding by Tractor . . . 377
Logs and Pulpwood, Tools for Manual Handling . . . 292
Looms, Textile (1976) . . . 270
Low Voltage Extension Light Cords and Systems (1981) . . . 316
Lumber Handling and Piling . . . 345A
Luminescent and Reflecting Materials . . . 245A

— M —

Magnesium . . . 426A
Management Policies on Occupational Safety (1978) . . . 585
Manila Rope Slings, Safe Use of . . . 259
Manlifts . . . 401A
Manganese . . . 306A
Manual Gauging and Sampling of Petroleum Tanks (1979) . . . 683
Masonry Saws (Stationary, Single-Blade Type) . . . 506A
Matchers, Wood Stickers, and Moulders . . . 384A

Material Handling
Bottles and Broken Glass . . . 355A
Calender Rolls, Handling . . . 403
Care and Inspection of Wire Rope (1977) . . . 667
Chains (Alloy Steel) for Overhead Lifting (1977) . . . 478
Concrete, Prestressed (Yard Operations) . . . 629
Conveyors, Belt (for Bulk Material) — Equipment (1978) . . . 569
Conveyors, Belt (for Bulk Material) — Operation . . . 570A
Conveyors, Roller (1979) . . . 528
Conveyors, Underground Belt (1978) . . . 447
Cranes, Pendant-Operated and Radio Console-Controlled (1978) . . . 558
Cranes, Tower . . . 630
Dock Plates and Gangplanks . . . 318A
Electromagnets Used with Crane Hoists (1977) . . . 359
Entry into Grain Bins and Food Tanks (1977) . . . 663
Flammable Liquids in Small Containers (1976) . . . 532
Forging Industry, Handling Materials in . . . 551
Freight Car Doors . . . 374A
Freight Cars, Unloading Bulk Grain from (1979) . . . 521
Fusees and Torpedoes — Used in Railroad Operations, Handling and Storage of . . . 639
Gantry Trucks . . . 257
Hand Trucks, Powered . . . 317A
Handling and Storage of Water Transmission Pipes and Fittings (1979) . . . 623
Hoisting Equipment, Automotive (1979) . . . 437
Hoists, Construction Material . . . 511B
Industrial Lift Trucks (1977) . . . 653
Liquefied Petroleum Gases for Industrial Trucks . . . 479B
Load Dividers in Damage-Free (D/F) Railroad Cars . . . 650
Loading and Unloading of Trailers on Railroad Flatcars (1978) . . . 672
Log Skidding by Tractor . . . 377
Lumber Handling and Piling . . . 345
Manila Rope Slings, Safe Use of . . . 259
Molds (Heavy) in the Rubber Industry, Handling and Storage of . . . 507
Motor Trucks for Mines, Quarries and Construction (1977) . . . 330
Oil Field Pipe, Handling Large-Diameter . . . 463A
Paper Rolls, Handling and Storing . . . 596
Pipes and Fittings, Handling and Storage of Water Transmission . . . 623
Power Presses, Handling Finished Pieces at . . . 534
Pulpwood, Unloading at The Mill . . . 274
Ready Mixed Concrete Trucks (1976) . . . 617
Removing Piece Parts From Dies in Mechanical Power Presses (1981) . . . 534
Scrap Bailers . . . 611
Sheet Metal, Handling and Storage of . . . 434
Skids . . . 280A
Steel Plate, Handling for Fabrication . . . 565A
Strapping, Steel . . . 315A
Sulfur, Handling and Storage of Solid (1979) . . . 612
Sulfur, Handling Liquid . . . 592
Winches, Truck Mounted Power (1979) . . . 441
Wire Rope Slings, Recommended Loads for . . . 380A
Meat Packing Industry, Cleaning Compounds (1979) . . . 593
Medical and First Aid (see also Industrial Hygiene and Protective Equipment)
Bulk First Aid Kits . . . 651
Chemical Burns . . . 523
Dermatitis, Occupational (1981) . . . 510
Medical Services for Construction Projects . . . 640
Poison Ivy, Poison Oak and Poison Sumac . . . 304A
Rescue Methods (Rubber Industry), Mill and Calender . . . 509
Tick Bites (1978) . . . 669
Unit First Aid Kits (1980) . . . 202
Work Accident Records and Analysis . . . 527B
Mercury (1976) . . . 203
Mercury, Fulminate of (1978) . . . 309
Metal Cutting and Forming
Boring Mills, Horizontal Metal . . . 269A
Boring Mills, Vertical Metal (1979) . . . 347
Coated Abrasives . . . 452B
Cutting Oils, Emulsions, and Drawing Compounds (1977) . . . 501
Degreasing (Liquid), Small Metal Parts (1977) . . . 537
Degreasing, Vapor . . . 429A
Die Casting Machines (1977) . . . 266
Dies, Setting Up and Removing Power Press . . . 211A
Drill Presses, Metal-Working (1977) . . . 335
Drills, Portable Reamer (1979) . . . 497
Drop Hammers, Steam . . . 450

Electrical Controls for Power Presses . . . 624A
Forging Hammer Dies, Setup and Removal of . . . 467
Forging Presses, Mechanical . . . 560
Gear-Hobbing Machines . . . 382
Grinders, Portable . . . 583A
Handling and Storage of Sheet Metal . . . 434
Handling Finished Pieces at Power Presses . . . 534
Handling Materials (Forging Industry) . . . 551
Handling Steel Plates for Fabrication . . . 585
Kick (Foot) Presses . . . 363A
Lathes, Engine . . . 394A
Milling Machines, Metal Working (1976) . . . 364
Planers, Metal (1976) . . . 383
Power Press Point-of-Operation Guards . . . 637
Power Presses (Mechanical), Inspection and Maintenance of (1977) . . . 603
Press Brakes (1977) . . . 419
Saws, Metal (Cold Working) (1979) . . . 584
Scrap Balers . . . 611
Shapers, Metal (1977) . . . 216
Shearing (Cold) of Billets and Bars . . . 557
Shears, Alligator . . . 213
Shears, Squaring, Metal (1977) . . . 328
Soldering and Brazing, Hand (1978) . . . 445
Upsetters . . . 486

Metal Hydrides (1979) . . . 462
Metal Planers (1976) . . . 383
Metal Shapers (1977) . . . 216
Metals (Combustible), Fire Protection (1979) . . . 567
Methanol (1979) . . . 407
Methylene Chloride (Dichloromethane) (1979) . . . 474
Milling Machines, Metal-Working (1976) . . . 364
Mill and Calender Rescue Methods . . . 509
Mining and Quarrying (*see also* Construction *and* Explosives)
Ammonium Nitrate/Fuel Oil Mixtures as Blasting Agents . . . 536
Ammonium Nitrate/Fuel Oil Mixtures in Underground Mines (1977) . . . 604
Berms in Pits and Quarries (1979) . . . 683
Conveyors, Belt (Equipment) (1978) . . . 569
Conveyors, Belt (Operation) . . . 570A
Conveyors, Roller . . . 528A
Conveyors, Underground Belt (1978) . . . 447
Detecting and Supporting Loose Rock or Ore (1978) . . . 378
Drilling in Open-Pit Mines . . . 573A
Drills, Jack Leg . . . 504
Drills, Portable Reamer (1979) . . . 497
Drinking Water at Construction Site . . . 399A
Electric Blasting, Treatment of Extraneous Electricity . . . 644
Explosives, Protection from Theft . . . 648
Jumbo Drilling of Rock (1979) . . . 538
Loaders, Front-End (1977) . . . 589
Load-Haul-Dump Machines in Underground Mines (1977) . . . 576
Medical Services at Construction Site . . . 640
Motor Graders, Bulldozers and Scrapers . . . 256A
Motor Trucks for Mines, Quarries and Construction (1977) . . . 330
Noise Suppression in Mines (1976) . . . 615
Power Shovels, Draglines, and Similar Equipment, Operation of . . . 271
Prevention of Falls Through Openings in Mines (1978) . . . 387
Raise Boring in the Mining Industry (1977) . . . 599
Rock, Falling or Sliding in Quarries . . . 332A
Rocker-Type Loading Machines in Mines (1977) . . . 209
Secondary Breaking of Rock in Quarries (1978) . . . 586
Silicon Diode Grounding Devices (1979) . . . 581

Mists, Dusts, and Fumes in Industry (1980) . . . 531
Mixers, Pan-Type, and Mullers (1977) . . . 526
Mobile Equipment, Grounding Electric Shovels, Cranes and other (1979) . . . 287
Molding of Plastics, Injection (1978) . . . 454
Molding of Plastics, Transfer and Compression (1978) . . . 632
Molds (Heavy) in the Rubber Industry, Handling and Storing . . . 507
Motion Pictures for Safety (1980) . . . 556
Motors and Machinery (Electric), Cleaning . . . 295A
Motors (Electric), Maintenance in Hazardous Locations of . . . 546A
Moulders, Matchers, and Wood Stickers . . . 384A
Mounting Heavy-Duty Tires and Rims . . . 411
Mullers and Other Pan-Type Mixers (1977) . . . 526

— N —

Naphthalene (Crude and Refined) (1978) . . . 370
Nets (Safety) for Construction Projects . . . 608A
Nitrate-Nitrite Salt Baths for Heat Treating (1979) . . . 270
Noise Suppression in Mines (1977) . . . 615
Nonprojected Visual Aids . . . 564A

— O —

Occupational Dermatitis (1981) . . . 510
Occupational Safety, Management Policies on . . . 585
Off-the-Job Safety (1978) . . . 601
Oil Field Pipe, Handling Large-Diameter . . . 463A
Oxalic Acid (1978) . . . 406
Oxygen, Gaseous (1977) . . . 472

— P —

Paint Spraying and Detearing, Electrostatic . . . 468A
Painting, Airless Spray (1977) . . . 548
Painting, Bridge . . . 296A
Paper Bag Manufacturing . . . 502A
Paper Machines . . . 290A
Paper Rolls, Handling and Storing (1978) . . . 596
Patching and Repairing, Bituminous Pavement . . . 647
Pavement Marking of Streets, Roads, & Highways . . . 643
Pavement Patching and Repairing, Bituminous . . . 647
Paving With Portland Cement Concrete . . . 541A
Perchloric Acid . . . 311A
Perchloroethylene (1978) . . . 673
Permits, Hot Work . . . 522A
Peroxidizable Compounds (1976) . . . 655
Petroleum Tanks, Manual Gauging (1979) . . . 583
Phenol (Carbolic Acid) (1978) . . . 405
Phosphoric Acid, Storage and Handling of in the Fertilizer Industry (1978) . . . 674
Phosphorus — White . . . 282B
Photography for the Safety Professional . . . 619
Pickers, Textile (1976) . . . 654
Pickers, Wool (1977) . . . 265
Pickling of Steel Billets, Blooms, Rods, and Bars (1979) . . . 453
Picric Acid (1979) . . . 351
Pipe (Oil Field), Handling Large Diameter . . . 463A
Pipe (Sewer), Cleaning . . . 577A
Pipeline Radiography (1979) . . . 600
Pipes & Fittings, Handling and Storage of Water Transmission (1979) . . . 623
Pipes, Valves, & Fittings, Application of Protective Coatings (1979) . . . 613
Planers, Metal (1976) . . . 383
Planers, Wood, Power Feed . . . 225A
Plant Protection, Firearms for (1977) . . . 413
Plasma-Jet Torches, Gas-Shielded Arc and . . . 552
Plastics, Compression and Transfer Molding of (1978) . . . 632
Plumbers' Furnaces, Blowtorches and (1979) . . . 470
Poison Ivy, Poison Oak, and Poison Sumac . . . 304A
Policies, Management, on Occupational Safety (1978) . . . 585
Portland Cement, Paving with . . . 541A
Posters, Bulletin Boards, & Safety Displays . . . 616
Powder Actuated Hand Tools (1979) . . . 236
Power Press Dies, Set Up & Removal (1976) . . . 211
Power Press Point-of-Operation Guards . . . 637
Power Presses, Electrical Controls for . . . 624A
Power Presses, Handling Finished Pieces at . . . 534
Power Presses, Inspection and Maintenance of Mechanical (1977) . . . 603
Power Shovels, Draglines, and Similar Equipment, Operation of . . . 271
Press Brakes (1977) . . . 419
Presses (Automatic), Tire-Curing . . . 625A
Presses, Baling (1977) . . . 666
Presses, Metal Working Drill (1977) . . . 335
Presses, Kick (Foot) . . . 363A
Presses, Mechanical Forging . . . 560
Pressure (Gate & Plug) Valves, Maintenance (1978) . . . 440
Pressure Vessels and Pressure Systems in the Research and Development Lab (1979) . . . 678
Pressurized Gas Systems (Aerospace Industry) (1976) . . . 590
Printer-Slotters (1978) . . . 348
Projected Still Pictures (1980) . . . 574

Protective Equipment (*see also* Medical *and* Industrial Hygiene)
Climbing Devices, Fixed Ladders and . . . 606A
Diving in Construction Industry . . . 886
Electrical Safety in Health Care Facilities . . . 890
Falls Down Mines, Prevention . . . 207A
Firearms for Plant Protection (1977) . . . 413
Hats, Safety . . . 561A
Insulated Flexible Equipment for Electrical Workers (1980) . . . 896
Linemen's Climbers, Care of . . . 630A
Nets, Safety . . . 608A
Respiratory Protective Equipment (1979) . . . 444
Roll-Over Protective Structures, Tractor Operation and (1978) . . . 622
Vessel Entry (Rubber Industry) . . . 458A
Vests, Buoyant Work . . . 628
Pulpers . . . 529A
Pulp Mill Digesters . . . 340A
Pulpwood and Logs, Manual Handling Tools . . . 292
Pulpwood, Unloading at The Mill . . . 274
Pyridine (1978) . . . 310

— R —

Radial, The Saw (1978) . . . 353
Radiant Heat Control . . . 381A
Radio Frequency Heating (1978) . . . 319
Radiography, Pipeline (1979) . . . 900
Rail, Laying Continuous Welded (1978) . . . 871
Railroad Car Wheels, Changing Out . . . 242B
Railroad Cars, Load Dividers . . . 650
Railroad Flatcars, Loading and Unloading of Trailers (1978) . . . 872
Raise Boring (Mining Industry) (1977) . . . 599
Reamer-Drills, Portable (1979) . . . 497
Records and Analysis, Work Accident . . . 527B
Records, Off-the-Job (1978) . . . 601
References (*see also* Safety Topics)
Sources of Information on Nuclear and Energy-Related Activities . . . 685
Writing and Publishing Employee Safety Regulations (1977) . . . 664
Reflecting and Luminescent Materials . . . 245A
Refuse Collection in Municipalities . . . 618
Regulations, Writing and Publishing Employee Safety (1977) . . . 664
Rescue Methods, Mill and Calender . . . 509
Respiratory Protective Equipment (1979) . . . 444
Rims and Tires, Mounting Heavy-Duty . . . 411
Rock (Falling or Sliding) in Quarries . . . 332A
Rock, Jumbo Drilling (1979) . . . 538
Rock or Ore, Detecting and Supporting Loose (1978) . . . 378
Rock, Secondary Breaking of (1978) . . . 586
Rocker-Type Loading Machines in Mines (1977) . . . 209
Rooftop & Ceiling Appliances, Servicing . . . 646
Roller Conveyors (1979) . . . 528
Roll-Over (Protective) Structures, Tractor Operation and (1978) . . . 622
Roofing, Asphalt (Manufacture) . . . 582
Rubber Cement, Spreading . . . 334A
Rubber Industry
Devulcanizers . . . 554
Guarding Calender Roll Bites (1978) . . . 449
Vessel Entry . . . 458A
Vulcanizers (1978) . . . 553
Rubber, Lining Tanks and Vessels With (1977) . . . 492
Runners, Floor Mats and . . . 595

— S —

Safety Committees . . . 631
Safety Displays, Posters, Bulletin Boards . . . 616
Safety Hats . . . 561A
Safety Nets for Construction Projects . . . 608A
Safety Topics (*see also* References *and* Visual Aids)
Accident Records and Analysis, Work . . . 527B
Hot Work Permits . . . 522A
Management Policies on Occupational Safety (1978) . . . 585
Off-the-Job Safety (1978) . . . 601
Safety Committees . . . 631
Writing and Publishing Employee Safety Regulations (1977) . . . 664
Sampling (Manual), Petroleum Tank Gauging and (1979) . . . 563
Sawmill Edgers . . . 571A
Sawmill Head Rigs . . . 460
Saws (*see also* Woodworking Machinery *and* Hand Tools)
Saws, Masonry (Stationary, Single-Blade) . . . 506A
Saws, Metal (Cold Working) (1979) . . . 584
Saws, Overhead Swing Cutoff and Straight Pull . . . 277A
Saws, Portable Power Chain . . . 320A
Saws, Radial (1978) . . . 353
Saws, Tilting-Table and Tilting-Arbor . . . 606A
Saws, Woodworking Band . . . 235A
Scrap Balers . . . 611
Scrapers, Bulldozers, and Graders . . . 256A
Selenium and Its Compounds (1977) . . . 578
Servicing Rooftop & Ceiling Appliances . . . 646
Sewer Pipe Cleaning . . . 577A
Sewers, Atmospheres in Sub-Surface Structures and (1979) . . . 550
Shapers, Metal (1977) . . . 216
Shapers, Wood . . . 333A
Shearing (Cold) Billets and Bars . . . 557
Shearing Machines, Cloth (1978) . . . 609
Shears, Alligator . . . 213
Shears, Squaring, Metal (1977) . . . 328
Sheet Metal, Handling and Storage of . . . 434
Shoring (Vertical) of Concrete Formwork (1981) . . . 628
Shovels (Electric), Grounding of Cranes & . . . 287
Shovels (Power), Operation of Draglines & . . . 271
Showers, Emergency and Eyewash Fountains (1980) . . . 686
Sidewalk Sheds (1979) . . . 368
Signs (Traffic) and Highway Markers (1976) . . . 659
Silicon Diode Grounding Devices (1979) . . . 581
Skidding by Tractor, Log . . . 377
Skids . . . 260A
Slashers, Cotton (1977) . . . 223
Slings (Manila Rope), Safe Use of . . . 259
Slings (Wire Rope), Recommended Loads for . . . 380A
Snow Removal and Ice Control on Highways . . . 638
Sodium (1978) . . . 231
Sodium Hydroxide (1976) . . . 373
Soldering and Brazing, Hand (1978) . . . 445
Sound Levels in the Glass Industry, Evaluation and Control of . . . 652
Spray Painting, Airless (1977) . . . 548
Spraying Paint & Detearing, Electrostatic . . . 468A
Static Electricity (1979) . . . 547
Steam and Hot Water, Cleaning with . . . 238A
Steam Drop Hammers . . . 450
Steel Chains (Alloy) in Overhead Lifting (1977) . . . 478
Steel Plates, Handling for Fabrication . . . 565A
Steel Strapping . . . 315
Stickers, Moulders, and Matchers, Wood . . . 384A
Storage Batteries, Lead-Acid (1979) . . . 635
Strainers & Extruders (Rubber Industry) (1978) . . . 610
Strapping, Steel . . . 315
Styrene Monomer . . . 627A
Substations, Industrial Electrical . . . 559
Subsurface Structures and Sewers, Atmospheres in (1979) . . . 550
Sulfur, Handling and Storage of Solid (1979) . . . 612
Sulfur, Handling Liquid (1978) . . . 592
Sulfuric Acid (1977) . . . 325
Surveying, Surface . . . 614A
Switches, Methods of Locking Out Electric (1978) . . . 237

— T —

Tanks, Entry Into Grain Bins and Food (1977) . . . 663
Tanks (Petroleum), Manual Sampling and Gauging (1979) . . . 563
Tanks and Vessels, Entry (Rubber Industry) . . . 458A
Tanks and Vessels, Lining with Rubber (1977) . . . 492
Testing (Cold Room) of Gasoline and Diesel Engines . . . 485
Testing (Electrical) Installations . . . 641
Testing Exhaust Ventilation Systems, Instruments for . . . 431
Testing, Ultra-Sonic Non-Destructive, for Metals (1976) . . . 662
Tetryl (1979) . . . 218
Textile Looms (1976) . . . 279
Textile Pickers (1976) . . . 654
Tick Bites (1978) . . . 669

Tilt Up Concrete Construction (1978) . . . 813
Tilting-Arbor & Tilting-Table Saws (1974) . . . 805
Tire-Curing Press Operations, Automatic . . . 625A
Tires and Rims, Mounting Heavy-Duty . . . 411
Tire & Tube Curing (Manual & Semiautomatic) . . . 385A
Toluene and Xylene . . . 204
Tools (see Hand Tools and Saws)
Torches (Blow) & Plumbers' Furnaces (1979) . . . 470
Torches, Plasma-Jet & Gas-Shielded Arcs . . . 552
Torpedoes and Fuzes—Used in Railroad Operations, Handling and Storage of . . . 639
Tractor, Log Skidding by . . . 377
Tractor Operation & Roll-Over Frames (1978) . . . 622
Traffic, Airport Vehicle (1977) . . . 539
Training (see Visual Aids)
Transfer & Compression Molding of Plastics (1978) . . . 632
Tree Trimming (1978) . . . 244
Trench Excavation (1978) . . . 254
Trichloroethylene (1979) . . . 389
Trimmers, Flatbed, Three Knife (1977) . . . 505
Trinitrotoluene (TNT) . . . 314A
Truck-Mounted Power Winches (1979) . . . 441
Trucks, Gantry . . . 257
Trucks (Industrial), LP-Gases for . . . 476B
Trucks (Motor) for Mines, Quarries, and Construction (1977) . . . 330
Trucks, Powered, Hand . . . 317A
Trucks, Industrial Lift (1977) . . . 853
Trucks, Ready Mixed Concrete (1976) . . . 617
Tubes, Cathode-Ray . . . 240A
Turpentine . . . 367A

— U —

Ultra-Sonic Non-Destructive Testing for Metals (1977) . . . 662
Underground Belt Conveyors (1978) . . . 447
Underground Residential Distribution of Electricity (1978) . . . 657
Unit First Aid Kits (1980) . . . 202
Unloading Bulk Grain From Freight Cars (1979) . . . 521
Unloading Pulpwood at The Mill . . . 274
Upsetters . . . 466
Utility Cables, Direct-Buried . . . 607

— V —

Valves, Maintenance of High Pressure Gate and Plug (1979) . . . 440
Valves, Pipes, & Fittings, Protective Coatings for Water (1979) . . . 613
Vapor Degreasers . . . 429A
Vegetation, Cutting and Clearing (1976) . . . 575
Veneer Clippers . . . 542
Veneer Peeling, Hot Log Preparation . . . 642
Ventilation Systems (Local), Checking Performance (1977) . . . 428
Ventilation Systems, Testing Instruments (1980) . . . 431
Vessels (see Tanks)
Vests, Buoyant Work . . . 626
Visual Aids (see also Safety Topics)
Motion Pictures for Safety (1980) . . . 556
Nonprojected Visual Aids . . . 564A
Photography for the Safety Professional . . . 619
Posters, Bulletin Boards, Displays . . . 616
Projected Still Pictures (1980) . . . 574
Vulcanizers (Rubber Industry) (1978) . . . 553

— W —

Warning Devices and Barricades for Highway Construction Work . . . 239B
Warpers and Beamers (1977) . . . 487
Watchman Safety (1977) . . . 212
Water Cleaning, High-Pressure (1977) . . . 633
Water (Drinking) on Construction Jobs . . . 369A
Water (Hot) and Steam, Cleaning with . . . 238A
Water Pipes, Valves, and Fittings, Protective Coatings for (1979) . . . 613
Water Transmission Pipes & Fittings, Handling and Storage (1979) . . . 623
Welding (see Metal Cutting and Forming)
Well Stimulation by Acidizing (1979) . . . 634
Wheels, Changing Out Railroad Car . . . 242B
Winches, Truck Mounted Power (1979) . . . 441
Windups and Letoffs (Rubber and Plastics Industries) . . . 518
Wire Rope, Care and Inspection of . . . 667
Wire Rope Slings, Recommended Loads on . . . 380A
Wiring (Temporary Electric) for Construction Sites (1980) . . . 515
Wood Rooms . . . 423A
Woodworking Machinery
Chippers and Hogs . . . 602
Jointers, Wood . . . 290A
Lathes, Wood Turning . . . 253A
Planers (Wood), Power Feed . . . 225A
Sawmill Edgers . . . 571A
Sawmill Head Rigs . . . 480
Saws, Overhead Swing Cutoff & Straight Pull . . . 277A
Saws, Portable Power Chain . . . 320A
Saws, Radial (1978) . . . 353
Saws, Tilting-Arbor and Tilting-Table . . . 805A
Saws, Woodworking Band . . . 235A
Shapers, Wood (1975) . . . 333
Stickers, Moulders and Matchers, Wood . . . 384A
Veneer Clippers . . . 542
Veneer Peeling, Hot Log Preparation for . . . 642
Wool Pickers (1977) . . . 285
Woolen and Worsted Cards (1976) . . . 295
Writing and Publishing Employee Safety Regulations (1977) . . . 664

— X —

X-Rays in Industry (1976) . . . 475
Xylene and Toluene . . . 204

— Z —

Zinc and Zinc Oxide (1978) . . . 267
Zirconium Powder . . . 382A

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SUPPLEMENTAL SAFETY INSTRUCTIONAL PACKETS

AUTOMOTIVE SUPPLEMENTAL SAFETY INSTRUCTIONAL PACKETS

GENERAL SAFETY INSTRUCTIONS—AUTOMOTIVE MECHANICS

1. Do not engage, under any circumstances, in any horseplay in the shop.
2. Stay out of cars unless the job requires being in them.
3. Always wear goggles when using a grinder or chisel, when sawing overhead with a hacksaw, or when chipping.
4. Do not watch someone weld without welding goggles or shield.
5. Do not wear watches, rings, arm bands, or jewelry of any kind while working in the shop.
6. Report all accidents to the instructor immediately. First aid will be given as necessary.
7. Do not allow any students other than those enrolled in the course at that hour in the shop without a guide and the instructor's permission.
8. Do not carry tools in your pockets.
9. Use compressed air with caution. Do not blow toward others.
10. Do not lift heavy objects. Secure help.
11. Do not use defective tools or equipment.
12. Never turn a switch on or off for another person, unless asked by that person.
13. Use a creeper only to work under. Keep it standing up when not in use.
14. Do not use your mouth to start a siphon hose.
15. Operate engines only when there is sufficient ventilation or the exhaust tube is connected and the fan on.
16. Avoid hot exhaust systems, engines, radiator and hoses and drop lights.
17. Do only authorized work in the shop.
18. Do not touch belts or pulleys while in motion.
19. Do not work in the dark. Use plenty of light.
20. Report any machine or other equipment that is out of order.

21. Move vehicles only if authorized to do so.

22. Start cars only in neutral and with the emergency brake on.

23. Secure your instructor's permission before starting an engine that has been worked on.

24. Always have a guide when moving a car in the shop.

25. Do not start an engine until the helper has given an all clear.

26. Never remove a radiator cap when water is steaming or boiling. When a radiator cools down, remove the cap with a rag and stand in the clear.

27. Keep your work area clean.

28. Put all tools away when you finish using them.

29. If oil or grease is spilled on the floor, clean it up immediately.

GENERAL SAFETY TEST FOR AUTOMOTIVE MECHANICS

Name:_____ Class:_____ Date:_____

1. Multiple Choice. For each item below select the one best answer. Then write the letter that represents your choice on the line to the left of each item.

_____ 1. When you spill oil or grease on the floor you should:

A. Clean it up when you are finished with your shop work
B. Leave it there for the custodian to clean up
C. Throw dirt on it
D. Clean it up immediately

_____ 2. When working underneath an automobile, you must wear:

A. Safety glasses
B. Hard-toed shoes
C. A hard hat
D. Gloves

_____ 3. You should carry your tools:

A. In your hands or a tool box
B. In your pockets
C. Pointed out in front of yourself
D. In a paper sack

_____ 4. When not in use, a creeper should be kept:

A. On the floor
B. In the classroom
C. Standing up against the wall or work bench
D. Under an automobile

_____ 5. The part of the engine that is most likely to cause serious burns is the:

A. Exhaust manifold
B. Carburetor
C. Air cleaner
D. Valve covers

_____ 6. When your repair work is completed, you should:

A. Clean up your tools and put them away
B. Clean up your work area
C. Dispose of used oil and all gasoline properly
D. All of the above

_____ 7. The work you do in the school shop should be:

A. For a friend
B. Approved by the instructor
C. For making extra money
D. Performed by at least three persons

_____ 8. Before moving an automobile in the shop:

A. Honk the horn three times
B. Notify all class members
C. Have a guide assist to make sure there are no obstacles
D. Fill the gasoline tank

_____ 9. In the shop, you are not allowed to wear:

A. Safety glasses
B. Long-sleeved shirts
C. Hard-toed shoes
D. Watches and rings

II. True-False. If you believe the statement is true, circle the "T." If you believe it is false, circle the "F."

T F 1. It is safe to run an engine in an enclosed area.

T F 2. You must tell the instructor of any accident, no matter how small.

T F 3. Carbon monoxide is a deadly gas.

T F 4. Horseplay is allowed in the shop near the end of the day.

T F 5. You are expected to lift your own work by yourself.

T F 6. Belts and pulleys should be adjusted only when the engine is stopped.

SAFETY INSTRUCTIONS FOR USING CAR LIFTS, HOISTS, AND CRANES

1. Obtain permission from your teacher before using a car lift, hoist or crane.

2. Ask your teacher to inspect the blocking of a car before it is raised.

3. Place a crane or hoist directly over the object to be lifted.

4. Determine that the chain, cable or rope to be used in lifting is in good condition.

5. Double-check the fastening of the chain, cable or rope to the object to make sure it is secure before lifting with the crane or hoist. Balance the object before lifting.

6. Make sure all persons and obstructions are clear before raising or lowering an engine or car.

7. Support the car with stands or blocks before doing work under the car or removing the wheels.

8. Obtain permission from your teacher before getting under a raised car.

9. Wear a face shield or safety glasses (goggles or spectacles) when working under a car.

SAFETY TEST FOR USING CAR LIFTS, HOISTS AND CRANES

Name: _____ Class: _____ Date: _____

Multiple Choice. For each item below select the one best answer. Then write the letter that represents your choice on the line to the left of each item. Fill in the blanks on 5 and 6.

_____ 1. Before doing work under a car that has been raised, or removing wheels, you should make sure the:

A. Transmission is in neutral
B. Car is adequately supported
C. Car is raised enough for the use of a creeper
D. Hand brake is applied

_____ 2. When you are about to raise an engine or car by a hoist or crane, you should be certain the:

A. Battery is disconnected
B. Transmission is in neutral
C. Hand brake is set
D. Object to be lifted is securely tied and balanced

_____ 3. You should place a crane or hoist directly over the object to be lifted so:

A. The weight may be raised faster
B. The crane, hoist, or object will not tip over
C. There will be less wear on the chain
D. Less room will be needed

_____ 4. After you have raised a car by a crane or hoist, you should place sufficient support under the car so you will be sure the:

A. Car will not roll away
B. Strain will be eliminated on the springs and shock absorbers
C. Hoist will last longer
D. Car will remain in the raised position

5. When lifting an engine with a chain sling, you should be sure the sling is securely _____.

6. Before getting under a raised car, you must obtain permission from the _____.

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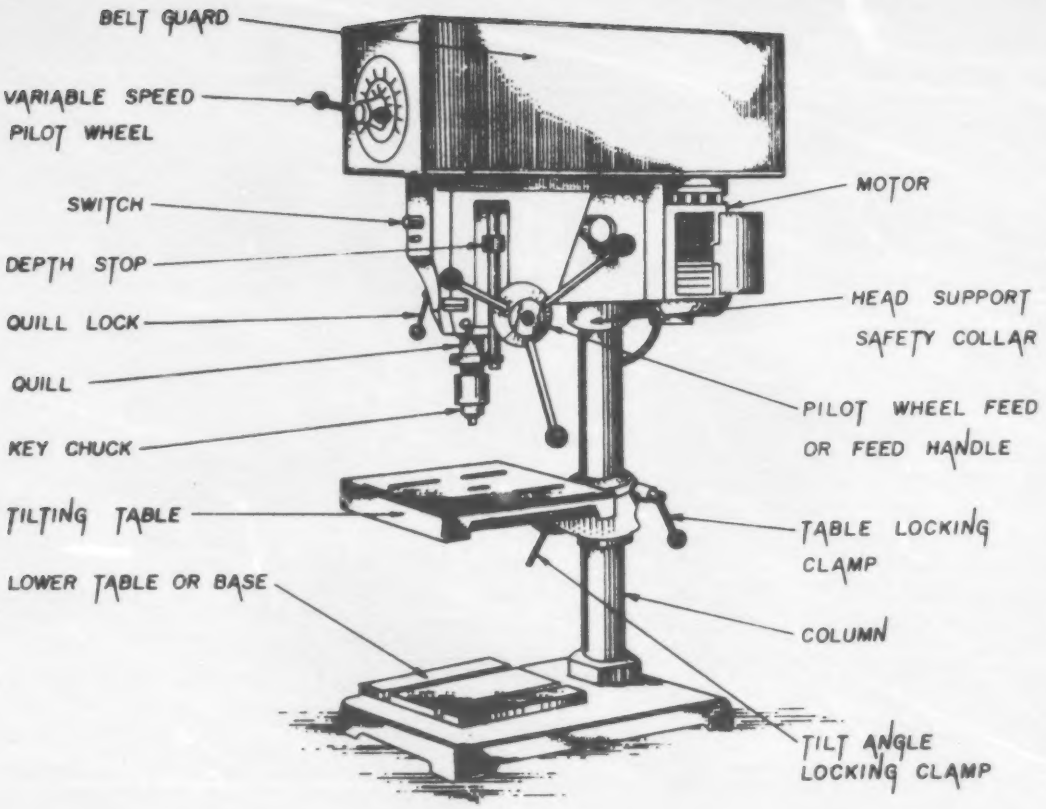

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SAFETY INSTRUCTIONS FOR OPERATING THE GRINDER

1. Obtain permission from the instructor before operating the grinder.
2. Wear proper clothing.
3. Wear a face shield, safety glasses, or goggles and use a glass safety guard on the grinder.
4. See that the guard is in place.
5. Set tool rest 1/16" to 1/8" from the wheel.
6. Dress the wheel when necessary.
7. Make sure that no one except you is inside the operator's zone.
8. Adjust the grinder for your job before turning the power on.
9. Stand to one side of the wheel when turning the power on. The wheel may be cracked, causing it to break up.
10. Turn on the power after permission is given.
11. Keep your hands away from the wheel while it is in motion.
12. Hold the work with your hands. Ask permission to grind small pieces.
13. Use the face of the wheel only.
14. Press materials against the wheel with the correct amount of pressure.
15. Keep work in motion across the face of the wheel.
16. Do not grind on the side of the grinding wheels.
17. Stand to one side when starting the machine.
18. Discard or report grinding wheels that are excessively small or cracked.
19. Hold all small work pieces with "vise grip" type of pliers.
20. Do not leave the machine until the grinding wheels have come to a full stop.

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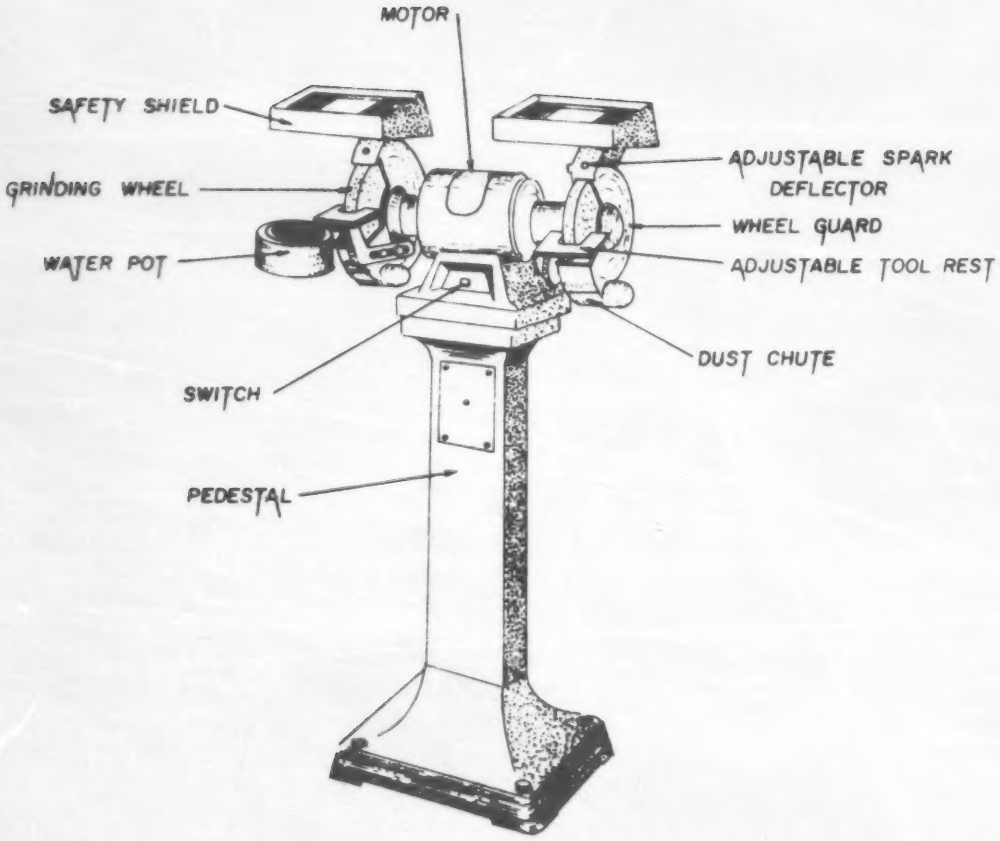


PEDESTAL GRINDER

SAFETY TEST FOR GRINDER

Name: _____ Class: _____ Date: _____

Multiple Choice. For each item below select the one best answer. Then write the letter that represents your choice on the line to the left of each item. Fill in the blank for questions 6 and 7.

_____ 1. You must wear a face shield or safety glasses when using a grinder because they:

A. Are becoming to you
B. Magnify the work, thus making it easier for you to see
C. Protect your eyes from bright light
D. Protect your eyes from flying particles

_____ 2. Adjust the grinder tool rest:

A. Immediately after the grinder is turned on
B. Before turning the power on
C. When the wheel in not in motion
D. After the power is turned off and the wheel is coasting

_____ 3. You should set the grinder tool rest:

A. 1/4" away from the wheel
B. So the wheel rubs lightly against the tool rest
C. 1/2" away from the wheel
D. No more than 1/8" from the wheel

_____ 4. To grind small pieces of stock, you should:

A. Hold them in your bare hands
B. Hold them with a rag
C. Use a coarse wheel
D. Receive special instruction and permission from the instructor

_____ 5. You should stand to one side of grinding wheel while it is gathering speed because:

A. It may have a defect, and the wheel will fly to pieces
B. The air currents from the wheel are unhealthy
C. It will tempt you to use the wheel too soon and cause it to stop
D. You can see if the wheel is running true

6. When using the grinder, you should keep your hands away from the _____.

7. To grind small pieces of stock, you should ask permission from the _____.

CARPENTRY/WOODWORKING
SUPPLEMENTAL SAFETY INSTRUCTIONAL PACKETS

GENERAL SAFETY INSTRUCTIONS FOR CARPENTRY/WOODWORKING

1. Wear eye protection when working in the shop.
2. Follow the safety procedures recommended for each power tool.
3. When working with heavy pieces of wood, such as sheets of plywood and two by four studs, wear a sturdy pair of shoes.
4. Keep materials neatly stacked.
5. Keep your work area clean and free from small scraps, excessive sawdust and oil.
6. Always remove nails from used lumber.
7. Keep tables of machines and other work surfaces free of nails, tools, wrenches and materials.
8. Never try to move materials past a person who is using a power tool or machine.
9. Never attempt to speak to, or otherwise startle, a person using a power tool or machine.
10. Never start or stop a machine for someone else. Always follow the machine operator's instructions when helping.
11. Make sure that all hand tools are sharp and in good working order.
12. Always carry sharp or pointed tools away from your body. Never put them in your pockets.
13. Never hold a small piece of wood in your fingers as you cut it.
14. Always use the guards on machines when provided. If a standard guard cannot be used, make use of holding and clamping devices and push sticks.
15. Plan your work before you begin. If large stock is to be cut, get help before you begin, not after you are in difficulty.
16. Never work on machines or power tools if you are tired or hurried. Accidents often happen when someone tries to do things too fast.
17. Make sure that a machine has come to a full stop before adjusting or oiling it, or changing a blade.
18. Get first aid treatment for even the slightest scratch.

19. Wear ear protection, such as ear plugs or ear muffs, when excessive noise is a problem.

20. Know the location of the fire extinguisher with proper extinguishing agents for wood, flammable liquids, and electrical equipment.

    Class A Fire—woods and paper products.
    Class B Fire—flammable liquids.
    Class C Fire—electrical equipment.

21. Return all finishing materials to metal containers and cabinet.

22. Place all oily rags in a metal approved container.

23. Use the dust collection system for stationary tools, if provided.

24. Keep your fingers and hands out of the path of sharp-edged cutting tools.

GENERAL SAFETY TEST FOR CARPENTRY/WOODWORKING

Name: _____ Class: _____ Date: _____

I. Multiple Choice. For each item below select the one best answer. Then write the letter that represents your choice on the line to the left of each item.

_____ 1. When working with heavy pieces of wood, such as sheets of plywood, etc., you should wear:

A. Sandals
B. Ear plugs
C. Sturdy shoes
D. Asbestos gloves

_____ 2. Your work area should be cleaned of scrap and sawdust:

A. Every hour
B. Once a day
C. Once a week
D. As frequently as it starts to become a hazard

_____ 3. Nails in used lumber that is brought into the shop should:

A. Be removed
B. Be bent over
C. Be hammered so the heads, not the points, stick out of the wood
D. Not be rusty

_____ 4. When a person is using a power tool or machine, and you are carrying materials, you should:

A. Shout at the person to have them move out of your way
B. Move right on past that person
C. Go far around that person
D. Shut off that person's power at the control box

_____ 5. While cutting small pieces of wood, hold the pieces in:

A. A vise
B. Your hands
C. Between your knees
D. "Vise grip" type of pliers

_____ 6. Most accidents happen in the shop:

A. Early in the class period
B. Just after break time
C. Late in the period or day, when students get hurried
D. Just after a vacation

_____ 7. Always adjust and oil machines:

A. When they are at a full stop
B. With the electricity turned off at the breaker box
C. With the approval of the instructor
D. All of the above

_____ 8. If you receive a minor injury, you should:

A. Go on with your work
B. Tell the principal or school director
C. Tell your instructor
D. Go see your doctor

_____ 9. Oily rags should be placed:

A. In metal containers
B. Outside the shop door
C. In a plastic bag
D. In the work bench drawer.

II. True-False. If you believe the statement is true, circle the "T." If you believe it is false, circle the "F."

T F 1. You must wear protection for your eyes when working in the shop.

T F 2. If a person is operating a machine, it is all right to talk with that person for a few minutes.

T F 3. Sharp tools are hazardous, so they should be kept slightly dull.

T F 4. Sharp or pointed tools should not be carried in your pocket(s).

T F 5. Always use guards when they are provided on machines.

T F 6. Wood finisher should be stored in wooden cabinets.

T F 7. You should never ask someone to help you with your work.

SAFETY INSTRUCTIONS FOR OPERATING CIRCULAR SAW

1. Be sure the instructor knows you are about to run this machine.
2. Wear proper clothing while operating the machine.
3. Wear safety goggles or glasses.
4. Make sure the saw guards are in place and operative. Guards must be kept down over the saw while the machine is being operated.
5. Do not raise the saw above the table more than absolutely necessary to make the cut, approximately 1/8 inch.
6. Use a push stick when ripping narrow pieces of lumber.
7. Fasten the clearance block to the fence when cutting off short pieces of stock.
8. Do not adjust the fence until the saw is at a dead stop.
9. Keep floor around the saw area clean. Sawdust underfoot is slippery!
10. Use a brush to keep the table clear of scraps. Never use your hands.
11. Keep your fingers clear of the track of the saw and never allow your your hands to cross the saw line in advance of the end of the board while the machine is in operation.
12. Never reach over the saw blade or pass wood over the saw blade.
13. Ensure that your instructor inspects all special set-ups and dado heads before the power is turned on.
14. Remove the dado head from the saw arbor after its use.
15. When helping to "tail-off" the saw, never pull on a board being ripped. Hold the board up and allow the operator to push the stock through the saw.
16. Do not saw on a circular saw without special permission from the instructor.
17. Do not cut cylindrical stock on a circular saw.
18. Never lower pieces of stock down over the saw. This operation is sometimes performed when cutting holes in rails for drawer fronts. Obtain special permission from the instructor for doing this type of work.

19. Do not rip stock without using the ripping fence. Neither should you cross cut stock without using the sliding crosscutting fence.

20. See that no fence or set-up will be in the line of the saw before starting work or turning on the power.

21. When sawing angles, be sure that the saw or tilting arbor saw will clear on both sides before the power is turned on.

22. Do no angle cutting on a tilting arbor saw without permission from your instructor.

23. Never stand directly behind the blade. Stay to the left.

24. Do not turn a machine on or off for another person.

25. Only operator should be in safety area of the saw.

26. Make all adjustments and remove chips or dust with the power off.

27. Never use the miter gage and fence together in the same operation.

28. Extend the saw blade above the workpiece until the gullets of the blade clear the material.

29. Never saw freehand. Use the miter gage when crosscutting, the fence when ripping.

30. Never reach over the saw blade.

31. Use extra care and precaution when sawing large material, or when using a dado or molding cutter head.

32. Use a push stick when ripping narrow stock or when your hands would be close to the blade.

33. Do not stand in the line of the cut when operating the saw.

34. Lower the blade and be sure it has come to a full stop before leaving the machine.

35. Be sure that all lumber is free of loose knots, nails, sand, paint or other foreign material.

36. Set and use a ripping fence, when ripping; and a cutoff gauge, when crosscutting. See that the cutoff board is properly mounted on gauge.

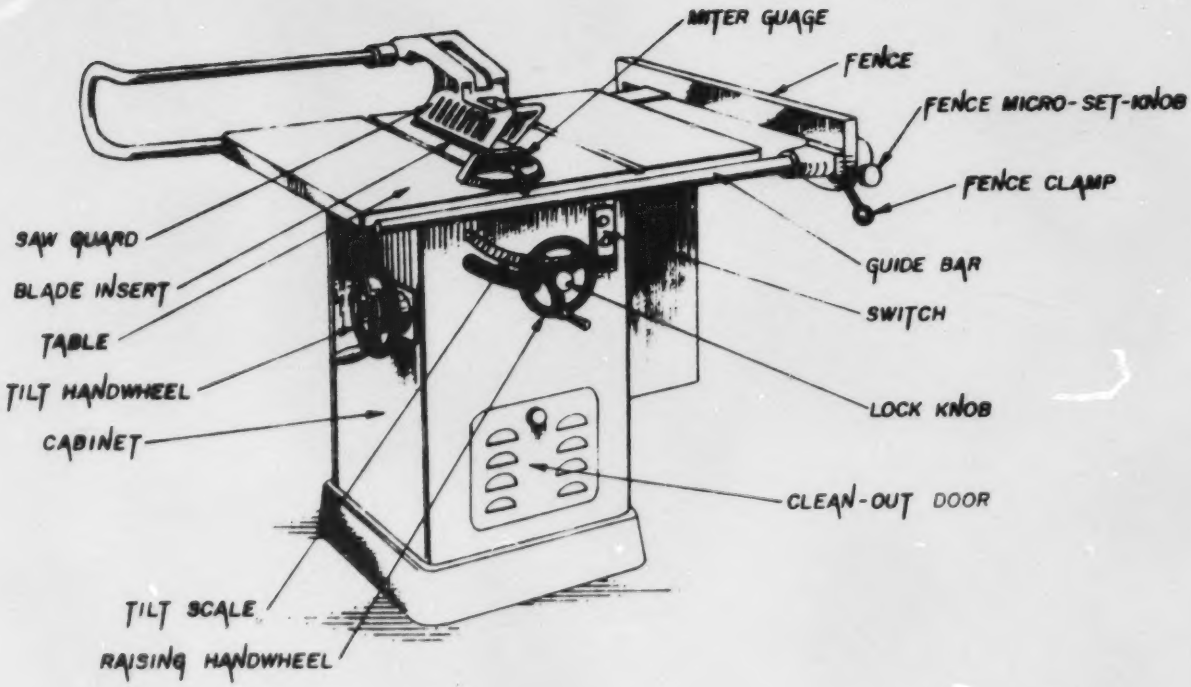
37. Use a holding jig or a safe method of clamping the guides when cutting round stock. Check with your instructor before turning on the machine.

38. Clamp or fasten a clearance block to a ripping fence or a table, when it is used as a gauge to cut stock to a prescribed width.

39. Shut off the saw and move out of the operating zone to respond to anyone trying to attract your attention.

40. After using saw on any special setup, return all adjustments, guides, etc., to the normal operating position before leaving the work place.

TRANSPARENCY MASTER



CIRCULAR SAW

SAFETY TEST FOR CIRCULAR SAW

Name:_____ Class:_____ Date:_____

Multiple Choice. For each item below select the one best answer. Then write the letter that represents your choice on the line to the left of each item. Fill in the blanks for questions 6 and 7.

_____ 1. The guard must always be in place over the saw blade of the circular saw except when:

A. The machine is not in operation
B. Short pieces tend to catch under the guard
C. Using a thick blade
D. Your teacher has authorized its removal for special setups

_____ 2. All adjustments on the circular saw are made:

A. While the machine is coasting
B. By the shop foreman
C. While the machine is at a dead stop
D. While the power is on

_____ 3. You should limit the extension of the circular saw blade above the stock being cut to:

A. 1 inch
B. 1/4 inch
C. 1/8 inch
D. 1/2 inch

_____ 4. When tailing off on the circular saw, the helper must:

A. Support stock from underneath, but not grasp it
B. Pick up all tailings that might cause an accident
C. Use a brush when cleaning up tailings
D. Hold the stock and pull gently

_____ 5. You should use a push stick when operating the circular saw to:

A. Rip short and narrow pieces of stock
B. Adjust the saw
C. Turn on the power
D. Remove scraps

6. Dadoing and tilting the arbor are special setups. Therefore, you must obtain the approval of your _____.

7. To avoid being hit by flying material, you should stand to one side of the line of the saw_____.

SAFETY INSTRUCTIONS FOR OPERATING THE JOINTER

1. Be sure your instructor knows you are about to operate this machine.

2. Wear proper clothing, close fitting, tuck-in necktie, and tighten apron.

3. Wear safety goggles or glasses.

4. Make sure that the guards and fence are in operable position. The guard must be kept over knives at all times while the jointer is being operated.

5. Adjust the depth of the cut before the power is turned on.

6. Do not use the jointer for stock less than 12 inches long, or less then 1 inch wide. Face cuts on lumber thinner than 1/4 inch should not be cut on the jointer.

7. Always use a push stick when machining pieces shorter than 15 inches, and when jointing narrow pieces and face of stock. Use a hand plane for any pieces less than 12 inches long.

8. Stand to one side of the jointer when turning on the machine.

9. Keep knives sharp and of equal heights to avoid kickback. Equal knife weight is important to maintain cutterhead balance.

10. Avoid placing hands directly above knives at any time. Form the habit of "stepping over" the knives with hands as board proceeds through machine. Hold longer pieces so that the fingers point upward not downward toward the knives.

11. Have instructor check setups on a jointer for special operations such as beveling, tapering, etc., before power is turned on. Do any jobs on the jointer, other than cutting face or edge of stock, only with the instructor's help.

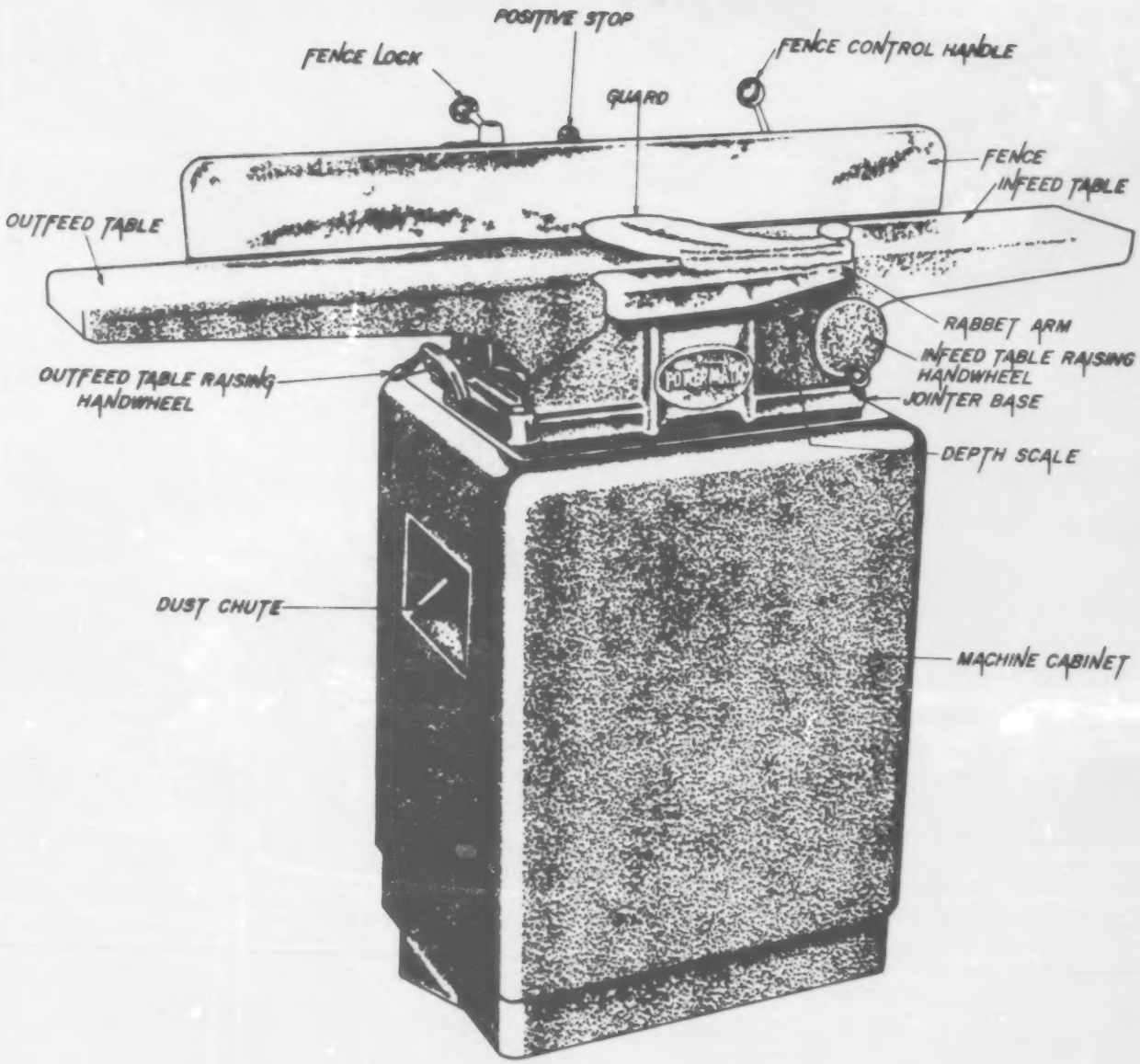
12. Do not make cuts on hardwoods any deeper than one-sixteenth of an inch.

13. Never change the rear table of the jointer. Never run the end grain of pieces of wood less than 12 inches wide over the jointer. You can joint pieces 12 inches and wider against the grain successfully.

14. Use a brush to free jointer or chips. Do not use the hand.

15. Stop the machine and wait for the cutterhead to stop turning before leaving the machine.

TRANSPARENCY MASTER



JOINTER

SAFETY TEST FOR USING THE JOINTER

Name: _____ Class: _____ Date: _____

True-False. Circle the "T" if the statement is true and the "F" if it is false.

1. T F Use the guard at all times, except when rabbeting and stop chamfering.

2. T F Kickback is caused only by dull knives, not because of making cuts too deep.

3. T F It is satisfactory to plane end grain if the stock is 10 inches or more in width.

Fill in the Blanks.

4. Do not plane stock shorter than _____ inches, or thinner than _____ inches.

5. Knives of unequal weight will cause _____.

6. A _____ must be used when chips are removed from the jointer.

7. A _____ must be used when jointing narrow pieces of stock.

Multiple Choice. Select the one best answer and write the letter that represents it on the line .

_____ 8. For safety purposes, it is wise to limit your depth of cut when jointing an edge to:

A. 1/8"
B. 1/4"
C. 5/16"

_____ 9. Feed the work so the knives will be:

A. With the grain
B. Against the grain
C. Either with or against the grain

_____10. The depth of the cut must be adjusted:

A. After the machine has reached its full operating speed
B. Before turning on the machine
C. Either A or B

SAFETY INSTRUCTIONS FOR OPERATING THE MORTISER

1. Obtain permission from your instructor before using the mortiser.
2. Wear proper clothing.
3. Wear a face shield, safety glasses or goggles.
4. Clamp all stock securely on the table.
5. Make adjustments only when the machine is at a dead stop.
6. Check with your teacher for the correct method of installing the mortiser bit and chisel.
7. Make adjustments for depth stops and lateral travel.
8. Make sure that no one except you is inside the operator's zone.
9. Turn on the power after permission is given.
10. Keep your hands away from the chisel when the machine is turned on.
11. Feed the chisel only as fast as the machine will easily cut.
12. Turn off the power immediately if the cutting is difficult or the chisel burns. Check with your teacher.
13. Lift the bit clear of the motiser before moving the table.
14. Turn off the power after using the mortiser and stand by until the machine has stopped.
15. Clean off the mortiser table.
16. Avoid making partial cuts except when the chisel width is wider than the portion to be cut.

SAFETY TEST FOR OPERATING THE MORTISER

Name:_____ Class:_____ Date:_____

Multiple Choice. For each item below select the one best answer. Then write the letter that represents your choice on the line to the left of each item. Fill in the blank for question 5.

_____ 1. You should make sure the chisel and bit of the mortiser are:

A. Sharpened before and after each use
B. Properly aligned
C. Adjusted so that the chisel leads the bit
D. Cooled after each cut

_____ 2. It is best that all stock used on the mortiser is:

A. Free of warps and checks
B. Big enough to hold with both hands
C. At least 1 inch thick and 1 foot long
D. Securely clamped on the table

_____ 3. If cutting on the mortiser becomes difficult or the chisel starts to burn, you should:

A. Turn off the machine and notify the teacher
B. Wax or grease the chisel
C. Press harder on the pedal
D. Release the depth stop

_____ 4. When the mortiser is turned on, you should:

A. Adjust for depth of cut
B. Change alignment ofthe chisel and bit
C. Keep away from the table
D. Keep your hands away from the bit and chisel

5. Before cutting on the mortiser, you should make sure your work is securely clamped on the _____.

SAFETY INSTRUCTIONS FOR OPERATING THE ROUTER

1. Obtain permission from the instructor before using the router.
2. Wear proper clothing.
3. Wear a face shield, safety glasses or goggles.
4. Fasten the stock firmly with the vise or the clamp.
5. Make adjustments only when the electric cord is disconnected from the power source.
6. Tighten all bits and cutters with proper wrenches
7. Ask the instructor to approve setup and adjustments.
8. Be sure the switch is in an "off" position and the machine is on its side before plugging in electric cord.
9. Hold the machine firmly.
10. Turn on the power after permission is given.
11. Keep hands clear of revolving cutters.
12. Feed the cutter slowly into the material.
13. Turn off the power and rest the machine on its side when a desired cut has been finished.
14. Disconnect the electric cord. Clean and return the machine and its parts to the designated place.

SAFETY TEST FOR USING THE ROUTER

Name:_____ Class:_____ Date:_____

Multiple Choice. For each item below select the one best answer. Then write the letter that represents your choice on the line to the left of each item. Fill in the blank for questions 6 and 7.

_____ 1. You should select a location that is dry and not grounded for using a portable electric tool or appliance so as to avoid:

A. Soiling the equipment
B. Serious electric shock
C. Motor bearing deterioration
D. Discoloring the electric cord.

_____ 2. Prior to using the router, you should:

A. Request other students to stay at least ten feet from the area of operation
B. Turn the blades by hand
C. Have the machine turned on before connecting the electric cord
D. Obtain permission from the teacher

_____ 3. Before changing bits or cutters or making adjustments on the router, you should make sure:

A. The electric cord is disconnected from the power source
B. Other students are at a safe distance
C. To turn blades by hand
D. One hand is free

_____ 4. When turning on the power to the router, you should:

A. Attempt to make as deep a cut as possible
B. Hold the machine firmly with both hands
C. Readjust bits and cutters
D. Reverse motor rotation

_____ 5. When cutting with the router, you should:

A. Feed the cutter as fast as possible
B. Hold electric cord with one hand
C. Keep hands clear of the revolving cutters
D. Rest the machine on its side

6. While using the router, you should hold it firmly with both_____.

7. It is best to feed the cutter of the router into the material _____.

SAFETY INSTRUCTIONS FOR OPERATING THE RADIAL ARM SAW

1. Be sure the instructor knows you are about to run this machine.
2. Wear proper clothing while operating the machine.
3. Wear safety goggles or glasses.
4. Always keep guards in place.
5. Before starting the machine, tighten all clamping devices.
6. Keep the saw well sharpened.
7. Be sure the saw sw ngs clear and free.
8. Place the stock snujly against the back-stop, and flat on the table.
9. Set the anti-kickback device one-eighth inch above the material to be cut.
10. Tighten the rip lock before ripping.
11. Always have two people while ripping.
12. Operate the saw with your left hand.
13. Before making any special adjustment, see that the saw is fully stopped.
14. While ripping, be sure to feed the material from the infeed end of the saw guard, never from the kickback end. Make no exception to this rule.
15. Before starting the motor, make sure everything is clear of the cutter.
16. Remove scraps from the path of the radial saw blade with a piece of wood while the saw is at a dead stop.
17. Stand to one side and keep your hands away from the direction of travel of the radial saw blade.
18. Use a radial arm saw primarily for crosscutting stock.

SAFETY TEST FOR THE RADIAL ARM SAW

Name:_____ Class:_____ Date:_____

Multiple Choice. For each item below select the one best answer. Then write the letter that represents your choice on the line to the left of each item.

_____ 1. The radial arm saw is used primarily for:

A. Cutting short stock
B. Ripping lumber into smaller strips
C. Crosscutting stock too long for a table saw
D. Curved cuts that cannot be done on band saw

_____ 2. In operating the radial arm saw, you must take great care:

A. Not to take too deep a cut, especially with a combination blade
B. To cut on the line you have intended to follow to avoid burning the blade
C. In feeding materials only as fast as it will easily cut
D. To be sure saw swings clear and free

_____ 3. You should remove scraps from the path of the radial arm saw blade with:

A. Your fingers
B. A tool, such as a rule
C. An air hose
D. A piece of wood only while the saw is at a dead stop

_____ 4. At the completion of each cut, the radial arm saw blade must be:

A. Returned to its position behind the guide fence
B. Removed and placed in its proper place
C. Rotated below the guide fence
D. Left at a point nearest to the operator

_____ 5. To rip on the radial saw, you must:

A. Operate the saw with the left hand
B. Have two people help
C. Be sure to have the rip lock tight
D. Feed from the kickback end

GENERAL SAFETY RULES TO BE OBSERVED WHILE FINISHING

In no other areas are fire hazards more prevalent than in the finishing section. All necessary precautions must be taken to reduce this hazard. The finishing area is subject to peculiar health hazards, which no other area possesses.

1. Clean rags, steel wool, and coated abrasives are costly material in the finishing department. Rags should be used in small pieces; steel wool should be used to the last particle; and coated abrasives should not be disposed of until they have fulfilled their usefulness.

2. There is a right and a wrong way to pour liquid from a can. Hold the can with the opening at the top. This technique permits the air to enter the can freely above the liquid. Thus, the liquid will flow freely and smoothly from the can. This method of pouring should be used on similarly smaller or larger cans.

3. Good housekeeping is essential for efficient operation of any finishing department. "Cleanliness is next to Godliness" holds true in the finishing department as well as elsewhere. It is impossible to produce an excellent finishing job in a dirty, dusty shop. Cleaning of the floors, walls, ceiling, and spray booth should be done periodically. Dry sanding which creates dust should not be permitted where wet finishing is carried on. All brushes and spray equipment must be kept clean.

4. Place all oily rags in a closed metal container. Most fires in the finishing department are caused by spontaneous ignition. Empty these cans regularly.

5. Maintain clean spray booth and dip tanks. Many fires originate in the spray booth where paint fumes and overspray are constantly a menace. Do not clean the booth with highly flammable liquids.

6. Keep all containers of finishing materials and solvents covered. Not only will paint film form on open cans of paint, but volatile vapors will contaminate the air, creating a fire hazard.

7. Provide fire fighting facilities. Regardless of the preventive measures taken, fires will occur. The finishing department should be adequately equipped with fire extinguishers.

8. Wear a mask or respirator if needed.

9. Provide adequate ventilation, lighting, and exhaust systems. Proper ventilation reduces fire, explosion and health hazards.

10. Protect the hands and body from infection. Washing hands with volatile solvents may cause the skin to lose its natural oil. As a result the skin becomes dry and may crack, thus providing an avenue of infection.

11. Provide for fireproof storage space for all finishing materials.

12. Provide for proper heating and ventilation for the storage room to prevent extreme changes in temperature, for this condition may lessen the quality of the finishing material by constantly changing its viscosity.

13. Arrange the containers in an orderly manner and in such a way that the labels can be read without turning the cans around.

14. Be sure that all cans are properly and neatly labeled.

15. Never place finishing materials in the storeroom without covering them properly. Failure to conform to this practice will cause evaporation of volatile material and the contamination of materials by permitting moisture and dust to enter.

16. Wipe used paint cans free from paint before placing them back into the storage room.

17. Always use the older materials first.

SAFETY RULES TO BE OBSERVED WHILE FINISHING WITH SPRAY GUN

1. Booths are important. Some are dry and others are the air wash type. In any case, the booth must provide sufficient exhaust to keep the mist from drifting back into the room.

2. Control of your working environment is important. Keep floors and walls clean to prevent dirt from ruining your finish.

3. It is <u>most</u> important that you have sufficient exhaust in the booth to keep the air clear of mist.

4. When spray finishing is completed, remove the air cap from the spray gun. If dirtied with dry paint, let it soak in clean thinner. Later, brush and wipe off the air cap.

5. If any holes in the cap are clogged, probe them with a whittled match stick or toothpick. Do not ream the air cap holes with wire, nails or metal tools. This may damage the holes and result in imperfect spray patterns.

6. Now, attach the <u>gun</u> to the hose cleaner with a short length of hose, and pass air and thinner through the gun for cleaning.

7. Next, clean the air cap in thinner. Wipe the air cap and fluid tip and assemble the cap to the gun. Finally, the outside of the gun is wiped. This completes the cleaning operation.

8. For the dry exhaust type of booths in industry, this problem is best resolved by coating the inside of the booth with a removable coating. That goes for the distributor places or baffles, the exhaust fan blades and the easily reached parts of the exhaust stock as well.

Never drop the gun into a container of thinner to clean it. Because dirty solvent would foul the air passages of the gun, which were clean to begin with. Thinner also removes any lubrication from the gun and dries out the air valve and fluid needle packings.

10. First, loosen the air cap two or three turns and remove the material cup. Hold a cloth over the air cap, pull the trigger and force whatever material remains in the gun back into the cup. Then empty the cup of material and clean it thoroughly.

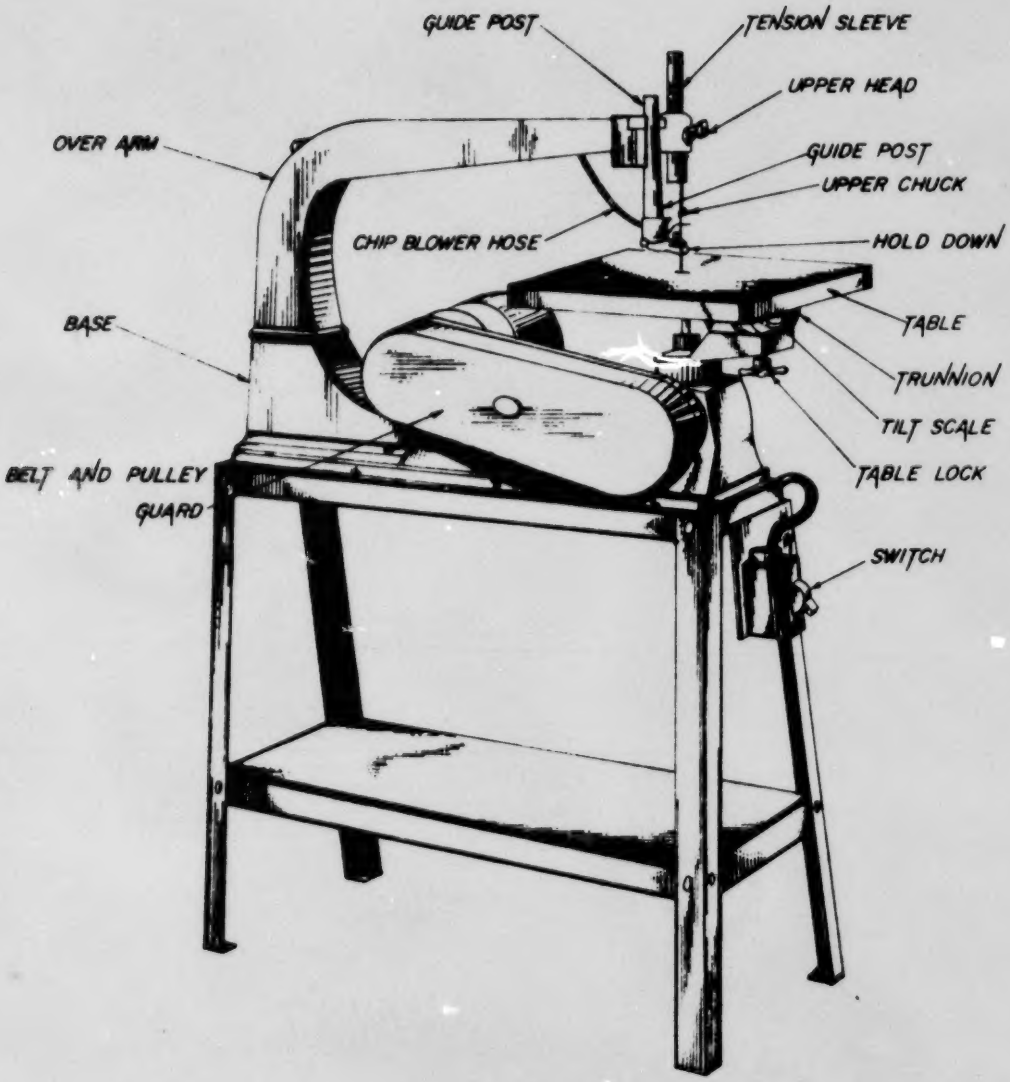
11. Next fill the cup about half full with thinner.

12. Then, after it has been reassembled properly, spray the thinner. This cleans out the passageways.

SAFETY INSTRUCTIONS FOR OPERATING THE JIG/SCROLL SAW

1. Obtain permission from your instructor before using the jig/scroll saw.
2. Wear proper clothing while operating this machine.
3. Wear the face shield, safety glasses, or goggles.
4. Cut only stock with a flat surface on bottom.
5. Make adjustments only when the machine is at a dead stop.
6. Install saw blades to cut on the down stroke.
7. Tighten blade securely in the lower vise, then in the upper vise. Check the blade for the correct tension.
8. Make sure the saw blade is the proper size for the job.
9. Adjust the hold-down so it will be as close as possible to the work.
10. Turn the machine by hand to make sure all parts are clear.
11. Make sure that no one except you is inside the operator's zone.
12. Select the correct machine speed.
13. Lower the hold-down foot to press lightly on the surface of the wood.
14. Turn on the power after permission is given.
15. Hold the material firmly.
16. Feed the material into the machine at a moderate rate of speed.
17. Keep the fingers away from the saw and the hands out of the path of the saw.
18. Report any mechanical defects or a broken blade to the instructor.
19. Turn off the power after using the scroll saw and stand by until the machine has stopped.
20. Clear away any scraps of wood on the table only after the saw stops running.
21. Ensure that the blade is held firmly in the chucks, is square with the table, and is properly supported by the guide assembly.
22. Guide the material slowly through the machine with both hands, keeping fingers away from the cut line.

TRANSPARENCY MASTER



JIG/SCROLL SAW

S33

SAFETY TEST FOR USING THE JIG/SCROLL SAW

Name: _____ Class: _____ Date: _____

Multiple Choice. For each item below select the one best answer. Then write the letter that represents your choice on the line to the left of each item. Fill in the blank for questions 6 and 7.

_____ 1. You should install the saw blade to cut:

A. On the down stock of the saw
B. At a minimum speed
C. On the up stroke of the saw
D. On both the up and down stroke of the saw

_____ 2. Before you start the saw, you should check the hold-down adjustment to make certain:

A. There is a one-half inch clearance between it and the stock
B. It is as close as possible to the work
C. The correct size of the blade is installed
D. It is against the table

_____ 3. Prior to starting the saw, you should turn the machine by hand to be sure:

A. Saw blade teeth point upward
B. Hold-down moves up and down
C. The beginning cut is on the line marked on stock
D. All moving parts are clear

_____ 4. Stock to be cut on the saw should be:

A. Soft
B. Hard
C. Flat on the bottom
D. Round on the bottom

_____ 5. You should feed stock into the saw:

A. In rhythm with the motion of hold-down
B. At a rate dependent upon the pulley speed
C. As fast as possible
D. At a moderate rate of speed

6. After installing a saw blade, you should check the blade for correct _____.

7. To ensure that all moving parts are clear after making adjustments on the saw, you should turn the machine by _____.

SAFETY INSTRUCTIONS FOR OPERATING THE SHAPER

1. Be sure your instructor knows you are about to run this machine. Have him check your setup before turning on the power.

2. Wear close fitting clothing. Roll up the sleeves and remove the necktie.

3. Wear safety goggles or glasses.

4. Make sure fences and guards are fastened tightly in place and that the cutter is properly installed.

5. Whenever possible, use working forms, templates, or holders. Fasten the stock in them securely. If a table guide is used, be sure it cannot slip.

6. Always use a brush to remove loose material from around the knives.

7. Always feed into the knives, never "back up" on a cut. Avoid taking deep cuts and feed the material at a steady rate, neither too fast nor too slow.

8. Make no adjustments on or near the spindle unless the power is locked off.

9. When leaving the machine, shut off the power and wait until the knives stop.

10. Choose the correct cutter and collars for the operation.

11. Expose only the amount of the cutter necessary to do the job. Use additional fixtures, if necessary.

12. Always use a starting pin for free hand shaping.

13. Use the smallest table insert possible.

14. Use three wing-one piece cutters whenever possible.

15. Brush away the dust and chips only when the machine is stopped.

16. Make sure the stock is free from cracks, splits, or loose knots.

17. Check to see that the cutters are seated correctly before tightening the spindle locknut.

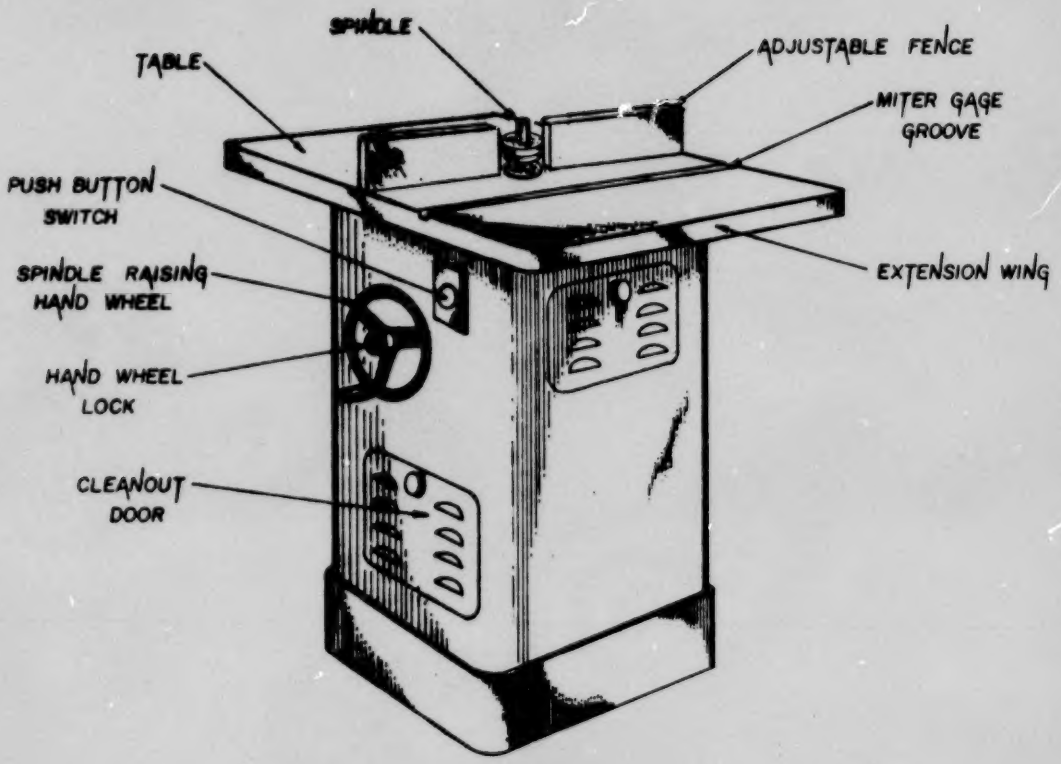
18. Use the spring guard and push stick. Keep hands away from the cutters.

19. Enter stock against the rotation of the spindle. Hold it firmly.

20. Test the setup on a safely sized piece of wood.

21. Feed stock steadily into the cutters. Govern the speed to get the smoothest cut.

TRANSPARENCY MASTER



SHAPER

SAFETY TEST FOR THE SHAPER

Name: _____ Class: _____ Date: _____

I. Fill in the blanks.

1. When leaving the machine, shut off the power and wait until _____.
2. Always feed wood _____ the knives.
3. Avoid taking _____ cuts and feed material at a _____ rate.
4. Always check with the _____ before using the shaper.
5. Make sure that the _____ and _____ are fastened tightly in place before using the shaper.
6. Make a trial cut on the same _____ wood as your project. (type, size or color?)

II. True-False. If you believe the statement is true, circle the "T." If you believe it is false, circle the "F."

T F 1. Make final adjustments on the shaper when it is running.

T F 2. Remove jackets, tuck in your tie, and roll up loose sleeves before using shaper.

T F 3. Have some other student turn on the shaper for you when you have a large piece of wood to hold.

T F 4. Remove the safety guard only if some other student is there to help you.

SAFETY INSTRUCTIONS FOR OPERATING THE BAND SAW

1. Be sure the instructor knows you are about to run this machine.
2. Wear proper clothing while operating machine.
3. Wear safety goggles or glasses.
4. Always keep guards in place. Both upper and lower wheels, as well as most of the blade itself, shall be guarded.
5. Adjust the guard to about 1/4 inch above the thickness of the stock.
6. Properly adjust the upper and lower guides when the machine is stopped completely, so that there will be a minimum of blade breakage.
7. Stop a clicking or cracked blade immediately.
8. Allow the saw to stop itself naturally in order that the blade may not be damaged.
9. Plan your cuts carefully, lay out and make release cuts before cutting long curves.
10. If the stock binds or pinches the blade, do not attempt to back out until the power has been shut off and the machine stops.
11. Always use the proper blade width for the diameter of the work being cut.
12. Remember that the right side of the machine is generally the most dangerous place to stand in case of blade breakage.
13. Proper blade tension shall be maintained.
14. The blade shall be sharp and properly set at all times.
15. Remove scrap material from saw table with a stick or brush.
16. If the blade breaks, shut off power and stand clear until machine stops entirely.
17. Make cuts always under power—never while machine is coasting.
18. Leave the machine only after the power is turned off and the blade has stopped moving. This is especially important with the band saw.

SAFETY TEST FOR THE BAND SAW

Name:_____ Class:_____ Date:_____

Multiple Choice. For each item below select the one best answer. Then write the letter that represents your choice on the line to the left of each item.

_____ 1. You should make all adjustments on the band saw:

A. Only when the machine is at a dead stop
B. More than 1/2 inch above the stock
C. While the machine is coasting
D. Only when the power is on

_____ 2. It is best to set the upper saw guide of the band saw:

A. When the power is off and the saw is coasting
B. 1/4 inch or less above the stock
C. Tight against the stock
D. 1/2 inch or more above the stock

_____ 3. You should plan your procedure on the band saw so that:

A. Small curves can be cut easily with wide blades
B. There will be a maximum forward feed with a minimum of backing out cuts
C. There will be little scrap left on the table
D. Back-outs can be made after each 1/2 inch forward feed

_____ 4. When it becomes necessary to back out stock from a long cut on the band saw, you should:

A. Carefully back the stock away while the blade is in motion
B. Stop the machine, then back out the stock
C. Try to turn the stock on the table
D. Continue to saw forward

_____ 5. If the band saw blade breaks or comes off, you should:

A. Call another student to shut off the power
B. Back your stock away from the blade immediately to avoid damage to your work
C. Continue cutting until the blade comes to a stop
D. Step away immediately, shut off the power (without endangering yourself), and then notify your teacher

SAFETY INSTRUCTIONS FOR OPERATING THE SANDER.

1. Be sure your instructor knows you are about to use the sander.
2. Wear proper clothing.
3. Wear safety glasses or goggles.
4. Make all adjustments before the electric plug is connected.
5. Before starting the motor, make sure the discs and belts are not torn or loose, and test the sand belt to see that it runs straight.
6. Check angles of the table before using the sander.
7. Sand the work only on the down side of the disc.
8. Keep the work moving across the abrasive surface while sanding at a moderate rate of speed. Holding it in one place burns the stock and wears out the sanding surface.
9. Use a coarse abrasive for rough work. The finer abrasives are for finish cuts.
10. Keep hands and fingers away from the abrasive surface. Avoid painful "abrasive burns."
11. Clean up the sander and floor area with a vacuum machine. Do not brush or blow away the fine dust into the air.
12. Leave the machine only after the power is off and the machine has stopped.
13. Hold work securely.
14. Be sure that the switch is in an off position and the machine is on its side before plugging in the electric cord on a portable sander.
15. Sand on the downward motion side of the disc sander.
16. Use special care in sanding small or irregular pieces. Check with your teacher.
17. Feed stock into the abrasive material at a moderate rate of speed and pressure.
18. Turn off the power and rest the portable sander on its side while changing the position of the board.
19. Turn off the power after using the sander and stand by until the machine has stopped.
20. Disconnect the electric cord of the portable sander and return the cleaned machine to the designated place.

SAFETY TEST FOR USING THE SANDER

Name: _____ Class: _____ Date: _____

Multiple Choice. For each item below select the one best answer. Then write the letter that represents your choice on the line to the left of each item. Fill in the blank for question 6.

_____ 1. You should make all adjustments on the portable sander:

A. While the electric cord is disconnected
B. Only when other students are at a safe distance
C. With one hand
D. While it is in gear

_____ 2. Before you plug in the electric cord of the portable sander, you should be certain the:

A. Machine is free of sawdust
B. Machine is resting on its abrasive surface
C. Sanding belt and disc are not torn or loose
D. Switch is turned off and machine is on its side

_____ 3. When operating a disc sander, you should hold your work against the disc:

A. Rim
B. Center
C. Upward motion side
D. Downward motion side

_____ 4. While the sander is in motion, you should:

A. Blow away the sawdust
B. Remove the abrasive surface
C. Use extreme feed pressure
D. Keep your fingers away from the abrasive surface

_____ 5. You should feed stock into the abrasive material of the sander:

A. As fast as possible
B. At a moderate rate of speed
C. Both upward and downward
D. Both forward and backward

6. Before leaving the machine, you should make sure the _____ is off.

SAFETY INSTRUCTIONS FOR OPERATING THE WOODWORKING LATHE

1. Be sure your instructor knows you are about to use this machine.

2. Wear proper clothing while operating machine. It is especially important that your sleeves be tight. No neckties.

3. Wear safety glasses, goggles or face shield.

4. Check the stock for soundness and for proper centering. When centered properly, clamp tailstock firmly in place and tighten screw.

5. Check the speed of the lathe for the operation you are to perform. In general, roughing stock and beginning cuts are done at low speed.

6. Be sure you have selected the proper sharp tools for the operations and that the handles are secure.

7. When holding the lathe turning tool, hold it firmly against the tool rest.

8. Adjust the tool rest and revolve the stock by hand before the power is turned on to be sure it can run clear. All adjustments to the tool rest should be made when the machine is completely stopped.

9. Set the lathe tool rest 1/4 inch or less from the rough stock. The tool rest should be 1/8 inch above the center of and parallel to the stock.

10. Remove the tool rest for sanding operations.

11. Use the proper speed for the diameter and hardness of the material. Stock shall be worked at the slow speed until it begins to take shape. It is safer to reduce stock to about 1/4" diameter and then saw off the waste ends.

12. Faceplate screws shall be kept tight.

13. Always maintain the correct spindle speed.

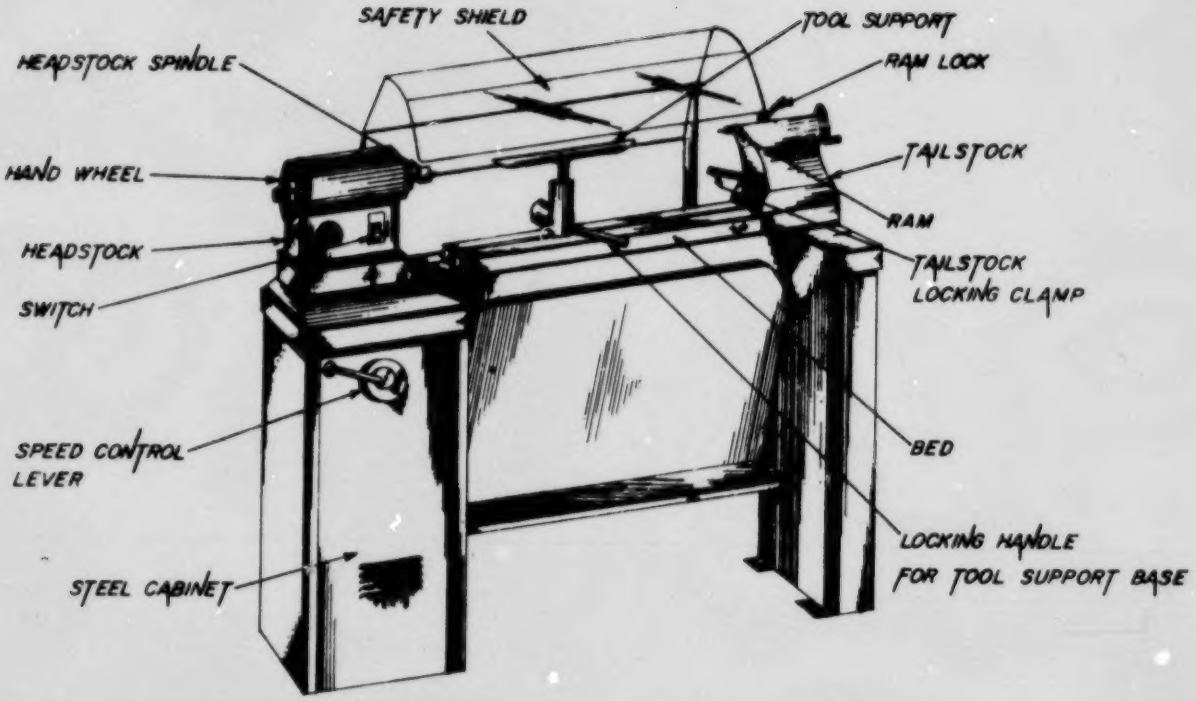
14. When finished with the work, remove the lathe centers from the head and tailstock.

15. Do not leave tools on the bed of the lathe while the lathe is in operation.

16. Allow no one to stand behind the lathe while it is in operation. Lathe tools caught by the wood have been thrown in that direction.

17. Large square stock is balanced better if the corners are cut off to form octagon shaped stock.

TRANSPARENCY MASTER



WOOD LATHE

SAFETY TEST FOR USING WOODWORKING LATHE

Name:_____ Class:_____ Date:_____

I. Multiple Choice. For each item below select the one best answer. Then write the letter that represents your choice on the line to the left of each item.

_____ 1. As soon as stock is located between center for spindle turning, you should:

A. Calmp tailstock firmly in place and tighten screw
B. Remove tailstock and mount steady rest on the ways
C. Rotate stock counterclockwise to avoid burning
D. Have it inspected by another student

_____ 2. You should make all adjustments of the lathe tool rest:

A. While machine is rotating slowly
B. After initial cuts are made
C. When lathe is at a dead stop
D. 2 inches below center of stock

_____ 3. It is best to set lathe tool rest so it is:

A. In slight contact with the stock, thus reducing clatter
B. Below and to right of center
C. The same width as the lathe tool being used
D. 1/4 inch or less from the rough stock

_____ 4. When starting lathe for a beginning operation, you should use:

A. The highest speed
B. The lowest speed
C. Any belt or gear ratio
D. A tool rest with a 3:1 ratio

_____ 5. You should hold lathe turning tool:

A. To the right of the tool rest
B. Flat on the tailstock
C. Firmly against the tool rest
D. Just above the tailstock

II. Fill in the blanks.

1. Before using the lathe, you should be sure sleeves are tight and remove or fasten any loose_____.

2. Tool rest adjustments on the lathe must be made when the machine is _____.

3. Prior to starting lathe, you should turn rough stock one revolution by _____.

4. Before sanding and finishing on the lathe, you should remove tool _____.

SAFETY RULES FOR OPERATING THE PLANER/SURFACER

1. Be sure the instructor knows you are about to operate this machine.
2. Wear proper clothing.
3. Wear safety glasses or goggles.
4. Make sure the guards are in place and operative.
5. Do not plane two or more pieces of stock with various thicknesses. They could be kicked out. Plane only one thickness at a time. (Note: Some planers have sectional feed rollers, which could allow planing various thicknesses. Ask your instructor.)
6. Keep your fingers from under the stock as it is fed through the planer.
7. Stock must be at least 15 inches long or greater than the distance between the centers of the infeed and outfeed rollers.
8. Always make sure the machine is turned off before leaving it.
9. Make sure everone is not behind the machine while it is in operation. Always stand erect and to one side of the work being planed.
10. Plane no thickness less than 1/3 inch. (Note: Some authors say 3/8 inch; some say 1/4 inch. Teachers must make the appropriate decision.)
11. Do not plane stock that is eight inches or less in width more than one-sixteenth inch per cut.
12. Stop the planer and run all pieces through, reducing all to the same thickness.
13. With a rule measure the thickness of the stock at the thickest point.
14. Place the stock on the bed of the planer with the working face down and the grain turned so that the knives will cut with the grain. Hold the board flat on the feed-in table when starting the cut. The knives on a single surface planer cut on the upper side and revolve in a direction opposite to the direction of feed.
15. Never attempt to plane cross-grain.
16. Keep hands away from feed rolls and away from board(s) already gripped by the feed rolls.
17. Allow material to travel completely through planer before making any additional depth of cut adjustment.

18. Use only clean lumber.

19. Be sure to check all material for loose knots, nails, and other foreign objects.

20. Do not force stock through the planer. Keep hands off the material and let the power feed operate.

21. Select the proper depth of cut and the rate of speed, depending on the stock being planed.

22. Properly support thin stock by a jig or back-up board. Check with the instructor for minimum thickness and length.

23. Never look directly into the throat of a planer at table level while it is running or in operation.

24. Remove shavings or chips when the power is turned off. Keep hands away from the chip guard and the point of operation.

25. Do not stand directly in front of the machine in the line of possible kickback.

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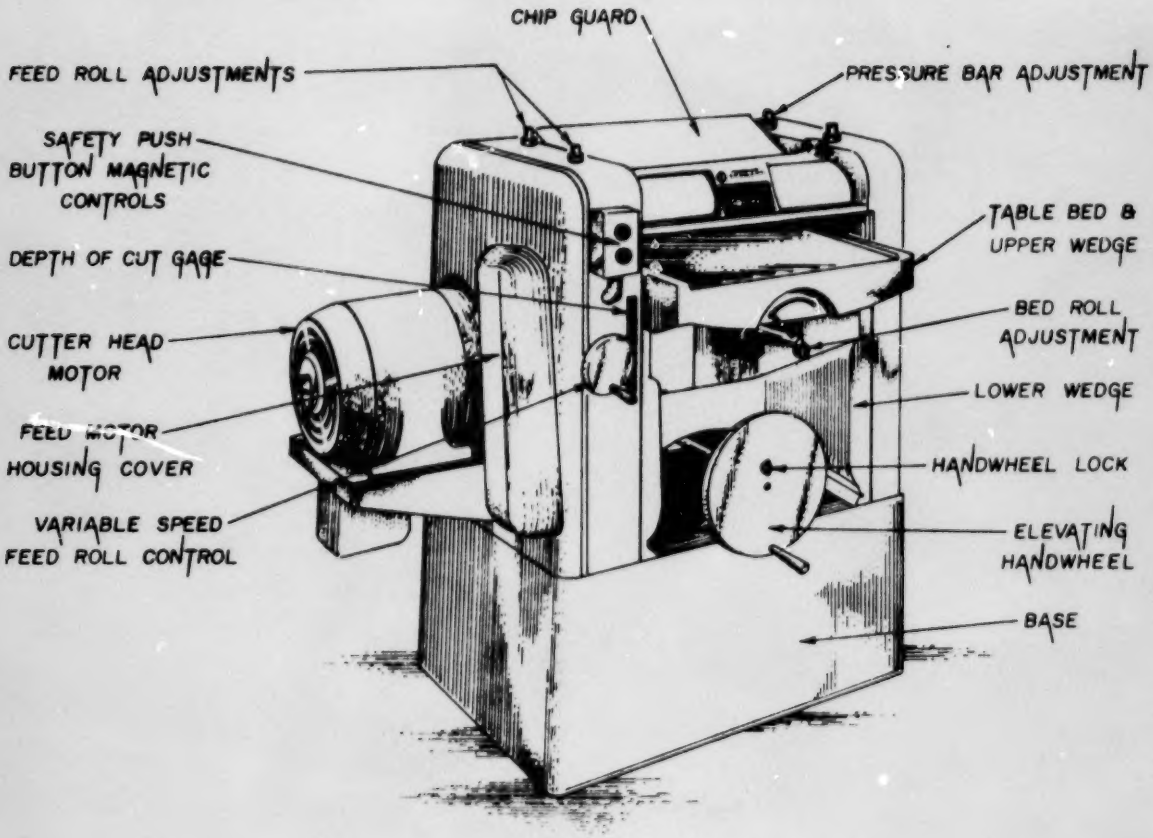
TRANSPARENCY MASTER



PLANER

SAFETY TEST FOR USING PLANER/SURFACER

Name:_____ Class:_____ Date:_____

I. Multiple Choice. For each item below select the one best answer. Then write the letter that represents your choice on the line to the left of each item.

_____ 1. Stock to be run through the planer must have a minimum length:

A. Determined by the depth of the cut
B. Determined by the width of the lumber
C. Greater than the distance between the feed rollers
D. 12 inches

_____ 2. When operating the planer, you should stand:

A. Behind the machine
B. In the area marked off for the machine
C. In front of the machine, provided you have someone to tail off
D. In an upright position and to one side of the machine

_____ 3. When board is gripped by the feed rolls of the planer, you should:

A. Push the stock through
B. Readjust the depth of the cut
C. Increase the cutting speed
D. Keep your hands away from the feed rolls

_____ 4. Thin stock may be planed by supporting it with:

A. A piece of sheet metal
B. A back-up board
C. Your hands
D. Another thin board

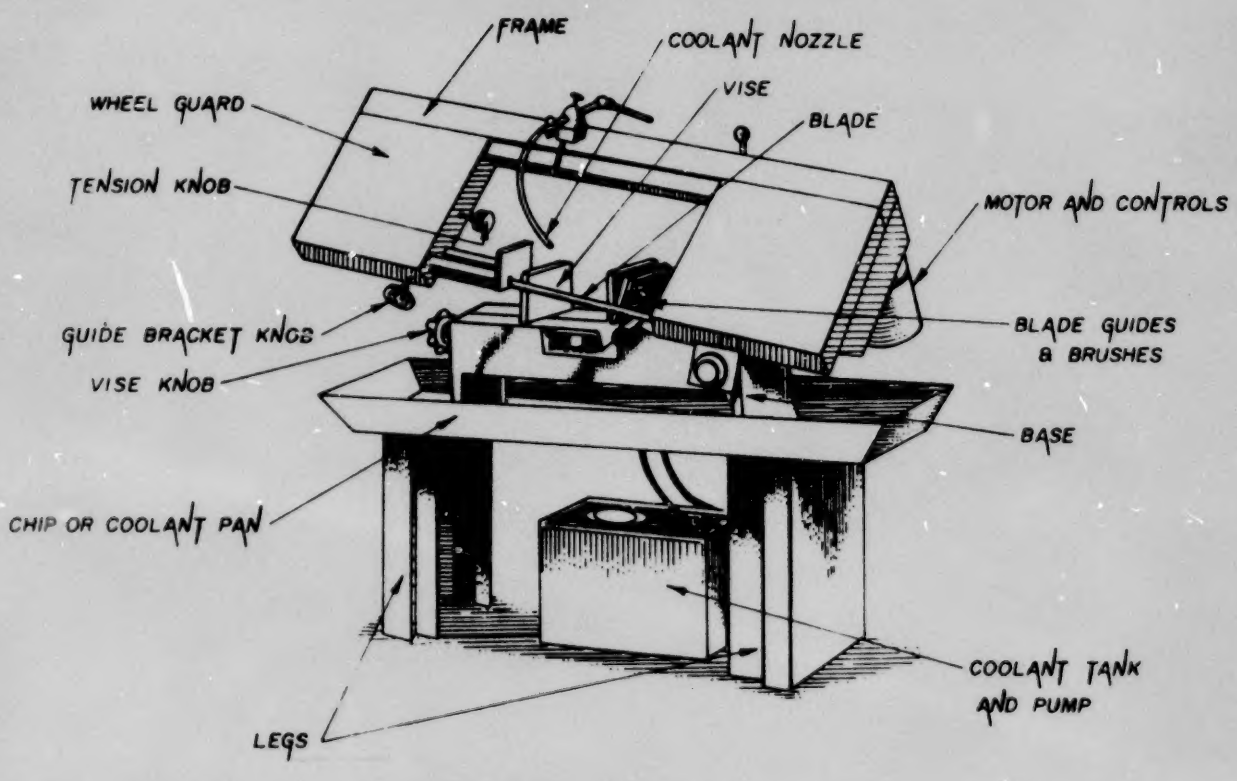
_____ 5. You may look into the throat of a planer while it:

A. Is turned off
B. Is planing a board
C. Has a board caught in its feed rollers
D. Is clogged with wood chips

II. Fill in the blanks.

1. Hold board on the feed-in table when starting the _____.
2. On stock 8" wide or less, you should limit the planer cut to _____ inch(es).
3. On wide boards, you should limit the planer cut to _____ inch(es).
4. If a planer does not seem to operate correctly, you should turn off the power and call the _____.

TRANSPARENCY MASTER



HORIZONTAL BANDSAW

ELECTRICITY/ELECTRONICS
SUPPLEMENTAL SAFETY INSTRUCTIONAL PACKETS

GENERAL SAFETY INSTRUCTIONS—ELECTRICITY/ELECTRONICS

1. After the power supply is turned off, work on the electrical circuits as if the power is on. Remember that "unloaded guns kill."

2. When a fuse burns out, check the circuit for the reason(s) before replacing the fuse.

3. Remember that safety devices are designed to protect you. However, they sometimes do not function—BEWARE!

4. Always replace a fuse with one of the proper rating for the circuit.

5. Adhere to the National Electrical Code and local regulations for safe and approved wiring.

6. Determine the type of current prior to repairing or replacing any wires.

7. Do not use any equipment which produces a slight shock when operated.

8. Never wear metal rings, bracelets, or chains while working in the electrical/electronics trades.

9. Never guess. Always know exactly what you are about to do.

10. Remember that standing in water or on a damp floor is hazardous, even when turning an electrical switch on or off.

11. Do not take a chance and touch one wire while thinking it is the ground wire.

12. Do not touch or move "downed" wires lying on the ground. Report them to the police department.

13. Always have another person with you while you work on high voltage.

14. On all occasions, study the hazards of electricity and acquire skill in preventing accidents.

15. Do not connect or operate loose wires and unknown switches without knowledge of their purposes.

16. Always wear rubber-soled shoes; stand on a rubber mat or a dry board without nails; and work as if the wires are "hot," when repairing or installing electrical equipment in a damp area.

17. Always work one side of a circuit at a time. This minimizes the danger of closing a circuit with your body.

18. Consider carefully all action around electricity. Physical movement should be unhurried.

19. Never turn on the power until you have notified all workers in the area.

20. Use a very dry stick to move either an unknown fallen wire or a person lying on a live wire.

21. Never operate an electrical appliance or fixture from the bathtub or sink.

22. Remember that proper grounding of all equipment is a must for the prevention of accidents and fatal injuries.

23. Always be sure the power is off before working on electrical equipment or circuits by testing with a glow tube tester.

24. Wait for vacuum tubes (which get very hot when in use) to cool before removing from the chassis.

25. Handle all components with care. Five and ten watt resistors get very hot and may give you a third degree burn.

26. Remember that capacitors retain a charge, which sometimes causes burns or a fatal shock.

27. Place or store soldering irons and guns after use in such a manner that someone does not accidentally burn himself/herself.

28. Never shake hot solder off when desoldering joints because you or your neighbor may be hit in the eyes, face, body or clothes.

29. Wear safety glasses when grinding, chipping, or working with hot metals which may splatter.

30. Wear protective gloves and clothing while working with acids, etchants, and finishing fluids.

31. Never disconnect ground wires leading from electrical fixtures.

32. Ensure that all electrical power tools are properly grounded.

33. Check all electrical cords for breaks in the insulation.

34. Inspect droplights to see that the socket, plug, and guard are in good condition.

35. Use battery powered lights, not more than twelve volts, in wet and damp places.

36. Deenergize the electrical circuits before working on wires or components.

37. Always lock or tag deenergized circuits so others will not turn on the power supply.

38. Always use a "drip loop" at the point of entrance of the service wires.

39. Do not carry plugged electrical power tools with your finger on the trigger switch.

40. Soldering irons should not be overly heated to the point that they are "red hot."

41. Do not use power driven fasteners that will go completely through the material and cause injury on the other side.

42. Always point the power driven fastener toward the work on the floor.

43. Only load the power driven fastener gun when it will be used immediately.

44. Always determine the amount of current that a particular gauge of wire may carry safely.

45. Do not use metal ladders while working on electrical equipment.

GENERAL SAFETY TEST FOR ELECTRICITY/ELECTRONICS

Name:_____ Class:_____ Date:_____

I. Multiple Choice. For each item below select the one best answer. Then write the letter that represents your choice on the line to the left of each item.

_____ 1. Downed wires lying on the ground should be reported to the:

A. Police department
B. School principal or director
C. Mayor's office
D. Closest electrician

_____ 2. When a fuse burns out, you should first:

A. Replace the fuse with one of the same capacity
B. Place a piece of heavy wire in the fuse holder
C. Replace the fuse with one of larger capacity
D. Check the circuit for cause of the burned-out fuse

_____ 3. Which of the following should be removed when working in the electrical/electronic trades?

A. Metal rings
B. Bracelets
C. Neck chains
D. All of the above

_____ 4. Hot soldering irons or guns should be placed:

A. In the middle of the work bench
B. On a wooden shelf
C. Where unsuspecting persons will not be burned
D. On the floor

_____ 5. If you do not know the purpose of a switch or loose wire, you should:

A. Connect the wires together or operate the switch to see what happens
B. Obtain information about their purpose
C. Put tape over them
D. Cut the wires off so they will neither show nor hide the switch

_____ 6. Power driven fastener guns should be loaded:

A. Before leaving the shop at the start of the work day
B. Upon arriving at the job site
C. Immediately before their use
D. All of the time

_____ 7. Which should you wear when working with acids and etchants?

A. Protective gloves
B. Safety glasses
C. Protective clothing
D. All of the above

_____ 8. The best ladders for working on electrical equipment are made of:

A. Wood
B. Aluminum
C. Steel
D. Brass

II. True-False. If you believe the statement is true, circle the "T." If you believe it is false, circle the "F."

T F 1. All electrical circuits should be treated as though they are "hot."

T F 2. It is always best to work on high voltage jobs by yourself.

T F 3. Placing a rubber mat on the floor in front of your workbench is a good safety practice.

T F 4. Electrical appliances or fixtures should never be operated from the bathtub or sink.

T F 5. When desoldering, you should melt the solder, then shake the solder off the joints.

SAFETY INSTRUCTIONS FOR OPERATING THE DRILL PRESS

1. Wear proper eye protection.
2. Hold material securely with a vise or clamps.
3. Select a properly sharpened bit. For metal, center punch when a hole is to be drilled.
4. Adjust the table or the depth stop to avoid drilling into the table.
5. Select the correct speed, normally slower for metal—faster for wood. The larger the bit, the slower the speed.
6. Be certain that the table and head of the drill press are secure.
7. Select the correct size and the kind of drill for the work. Be sure it is sharp.
8. Select the designated coolant for the drill press and apply it to the drill point as needed. (No coolant is used when drilling wood.)
9. See that the belt guard is in place.
10. Remove the chuck key immediately after using it.
11. Keep hands away from the revolving spindle, chuck, drill and chips.
12. Operate the feed handle so that the drill cuts evenly into the work.
13. Ease up on the feed pressure when the drill begins to break through the material.
14. Back the drill out as soon as the hole is drilled.
15. Allow the drill press to stop before attempting to remove the work, chips, or cuttings. Do not stop the revolving chuck with your hands.
16. Use a brush to remove the chips or the shavings.
17. Keep the floor clean around the drill press.
18. Step away immediately if the work comes loose and is caught in the drill. Shut off the power, if possible, without endangering yourself.

SAFETY TEST FOR OPERATING THE DRILL PRESS

Name:_____ Class:_____ Date:_____

Directions: These are multiple choice questions. Select the one best answer; then write the letter that represents your choice on the line to the left of each item. Fill in the blanks for questions 7 and 8.

_____ 1. When drilling, the work should be held:

A. By hand
B. By someone else
C. In a vise or clamps
D. On the floor

_____ 2. For drilling metal, you must:

A. Center punch where the hole is to be drilled
B. Mark the outer edges of the hole
C. Use a dull drill bit
D. Drill at the fastest speed possible

_____ 3. When drilling is completed, stop the revolving drill chuck by:

A. Hand
B. Jambing the drill bit into scrap stock
C. Throwing the drill into reverse
D. Allowing the drill to come to a stop by itself

_____ 4. Remove chips with:

A. A brush
B. A rag
C. An air nozzle
D. Your hand

_____ 5. When the floor becomes cluttered with chips:

A. Kick them over to one side
B. Sweep them up and put them in the trash can
C. Put a rubber mat over them

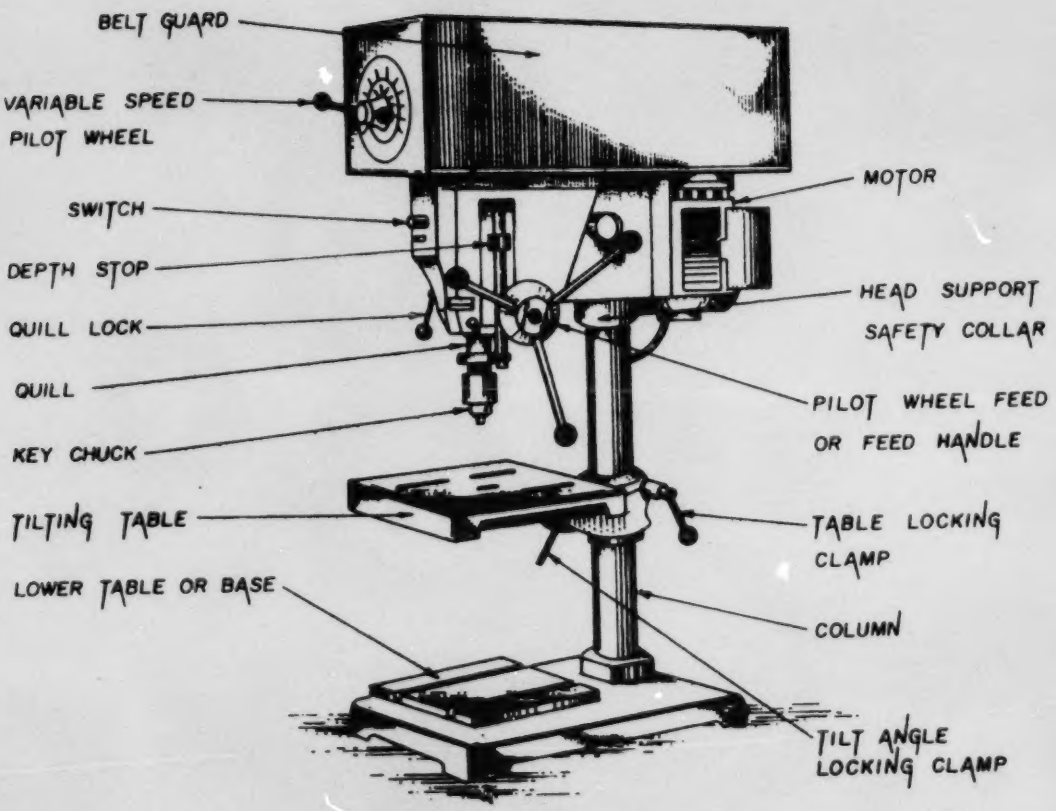
_____ 6. If the work is caught and spins around with the drill bit:

A. Grab the work and stop it
B. Leave the area and go out the nearest exit
C. Step away and turn off the power to the drill
D. Run to tell the school maintenance personnel

7. When drilling, you must protect your eyes by wearing_____.

8. To avoid drilling into the drill press table, you should _____ the _____stop.

TRANSPARENCY MASTER



DRILL PRESS

MACHINE SHOP SUPPLEMENTAL SAFETY INSTRUCTIONAL PACKETS

GENERAL SAFETY INSTRUCTIONS FOR THE MACHINE SHOP

1. Keep your work area free from scraps of metal stock.
2. Keep metal cutting tools sharp.
3. Always put a handle on a file before you use it.
4. Grind mushroom heads and all burrs off cold chisels, center punches, and other small hand tools.
5. Never try to hold a piece of metal in your hand while it is being machined. Use a fixture or a clamp to hold the workpiece.
6. Wear appropriate gloves when handling hot metals.
7. Always wear eye protection. A sliver of metal in the eye can cause blindness.
8. Put away tools and accessories. Clutter causes accidents.
9. Exercise caution when using portable hand tools, spot welders, electric shears, and the like. (These tools operate on at least 110 volts of electricity. This charge can either kill or cause a serious shock or burns under certain conditions.) Make sure that the power cords are in good working condition and that plugs are not broken. Keep cords away from oil and hot surfaces.
10. Be sure that your hands are dry before using an electrical power tool.
11. Never use measuring tools on metal while it is being machined.
12. Always keep machine guards in place. They were put there for your protection.
13. Operate a machine only after you have received instruction on its use. Remember that you must know what you are doing before you start a machine.
14. Stop a machine before oiling it.
15. Never "feel" the surface of a metal while it is being machined.
16. Clean chips off with a brush, never with a rag or your hand.
17. Never allow anyone to stand near a machine that you are operating.
18. Handle files carefully since they are brittle. They can shatter in your hands. Always use a file with a handle.

19. Wear protective clothing when working with hot metals.

20. Wear a face mask when there is a danger of flying chips.

21. Wear goggles when grinding metals.

22. Do not attempt to oil, clean, adjust or repair any machine while it is running. Stop the machine and lock the breaker box in the "off" position.

23. Get help for handling long or heavy pieces of material. Follow safe lifting practices, lifting with your legs, not your back.

24. Do not talk to others when they are operating machines.

GENERAL SAFETY TEST FOR THE MACHINE SHOP

Name: _____ Class: _____ Date: _____

I. Multiple Choice. For each item below select the one best answer. Then write the letter that represents your choice on the line to the left of each item.

_____ 1. Eye protection should be worn when:

A. Grinding
B. Drilling
C. Hammering metal
D. Doing all of the above

_____ 2. Machine guards may safely be removed:

A. To observe more closely a machining operation
B. To make an adjustment while the machine is off
C. To run large work through the machine
D. If the guard "gets in your way"

_____ 3. You may operate a machine:

A. Only when a friend shows you how to run it
B. If you read the instructions first
C. Only after you have received proper instruction and gained the instructor's approval
D. Anytime you want to

_____ 4. Metal chips should be cleaned off of machines:

A. With a bench brush
B. With your hands
C. With a rag
D. By using compressed air

_____ 5. Gloves may be safely worn when:

A. Operating a lathe in the shop
B. Handling hot objects
C. Stopping a spinning piece of stock in the lathe
D. Operating a milling machine

II. True-False. If you believe the statement is true, circle the "T." If you believe it is false, circle the "F."

T F 1. Occasionally, a practical joke is good for the morale and keeps people "on their toes."

T F 2. Clean your work station frequently to insure safe working conditions.

T F 3. Drag a piece of stock to your work station if it is too heavy to lift by yourself.

T F 4. Metal cutting tools should be kept dull so they won't cut the inexperienced machinist.

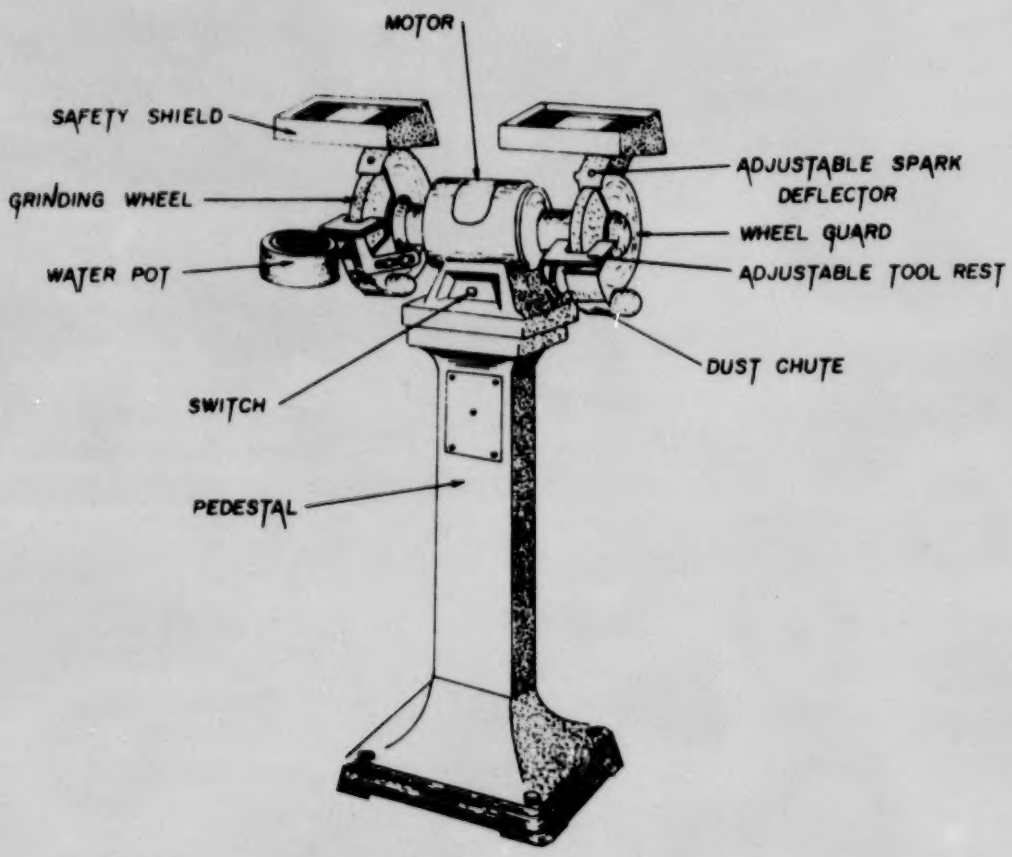
T F 5. Machines must be stopped before oiling them.

T F 6. You can safely carry on a conversation while operating a machine.

SAFETY INSTRUCTIONS FOR OPERATING THE GRINDER

1. Obtain permission from the instructor before operating a grinder.
2. Wear proper clothing.
3. Wear a face shield, safety glasses, or goggles and use a glass safety guard on a grinder.
4. See that the guard is in place.
5. Set tool rest 1/16" to 1/8" from the wheel.
6. Dress the wheel when necessary.
7. Make sure that no one except you is inside the operator's zone.
8. Adjust the grinder for your job before turning the power on.
9. Stand to one side of the wheel when turning the power on. The wheel may be cracked, causing it to break up.
10. Turn on the power after permission is given.
11. Keep your hands away from the wheel while it is in motion.
12. Hold the work with your hands. Ask permission to grind small pieces.
13. Use only the face of the wheel.
14. Press materials against the wheel with the correct amount of pressure.
15. Keep the work in motion across the face of the wheel.
16. Do not grind on the side of the grinding wheels.
17. Stand to one side when starting the machine.
18. Discard or report grinding wheels that are excessively small or cracked.
19. Hold small work pieces with a "vise grip" type of pliers.
20. Do not leave the machine until the grinding wheels have come to a complete stop.

TRANSPARENCY MASTER



PEDESTAL GRINDER

SAFETY TEST FOR THE GRINDER

Name:_____ Class:_____ Date:_____

Multiple Choice. For each item below select the one best answer. Then write the letter that represents your choice on the line to the left of each item. Fill in the blank for questions 6 and 7.

_____ 1. You must wear a face shield or safety glasses when using a grinder because they:

A. Are becoming to you
B. Magnify the work, thus making it easier for you to see
C. Protect your eyes from bright light
D. Protect your eyes from flying particles

_____ 2. Adjust the grinder tool rest:

A. Immediately after the grinder is turned on
B. Before turning the power on
C. When the wheel is not in motion
D. After the power is turned off and the wheel is coasting

_____ 3. You should set the grinder tool rest:

A. 1/4" away from wheel
B. So that the wheel rubs lightly against the tool rest
C. 1/2" away from the wheel
D. No more than 1/8" from the wheel

_____ 4. To grind small pieces of stock, you should:

A. Hold them in your bare hands
B. Hold them with a rag
C. Use a coarse wheel
D. Receive special instruction and permission from the instructor

_____ 5. You should stand to one side of a grinding wheel while it is gathering speed because:

A. It may have a defect, and the wheel will fly to pieces
B. The air currents from the wheel are unhealthy
C. It will tempt you to use the wheel too soon and cause it to stop
D. You can see if the wheel is running true

6. When using the grinder, you should keep your hands away from the _____.

7. To grind small pieces of stock, you should ask permission from the _____.

SAFETY INSTRUCTIONS FOR OPERATING THE MILLING MACHINE

1. Obtain permission from the instructor before using the milling machine.
2. Wear a face shield, safety glasses, or goggles.
3. Make adjustments or set up only when the machine is at a dead stop.
4. Use correct fitting wrenches on machine parts.
5. Handle all cutters carefully.
6. Use only a soft hammer or mallet to seat work against the parallels or the bottom of the vise.
7. Select the proper cutter. Be sure it is sharp.
8. Be sure the job is securely fastened.
9. Make certain that the work, milling machine table, and any holding device will clear the arbor and support during the cut.
10. Set the machine for the proper depth of cut.
11. Disengage handles when the automatic feed is to be used or the table is to be locked.
12. Select the correct feed.
13. Make sure that no one except you is inside the operator's zone.
14. Stand to one side of the machine.
15. Turn on the power after permission is given.
16. Be sure that the cutter is turning in the proper direction.
17. Feed against, or opposite to, the direction of the rotation of the cutter.
18. Use a brush to remove chips from work when the machine is at rest.
19. Keep the floor clean around the machine.
20. Turn off the power after using the milling machine and remain there until the machine has stopped.
21. Release all of the automatic feeds.
22. Clean the machine and the area with a brush.

23. Be sure the cutter is tightly held in the collet and the material is securely held by a vise, clamps, or magnetic chuck.

24. Check the spindle rotation, speed, depth of cut and all power feed adjustments before starting the cut.

25. Keep your hands away from the cutter. Remove the chips with a brush after the machine is turned off.

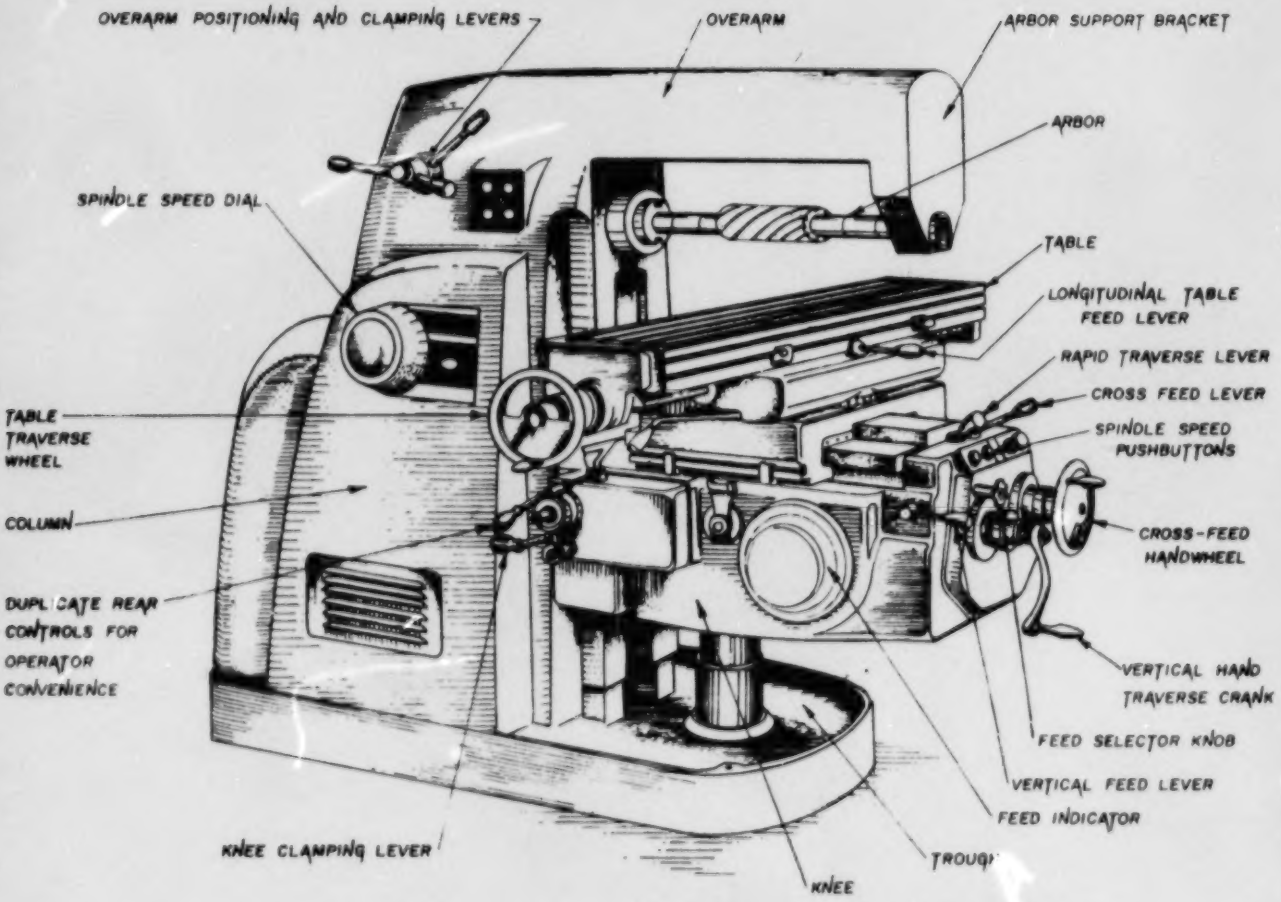
26. Once a cutting pass is made, do not back out or return to the starting position without proper clearance.

27. Do not climb cut without specific permission.

28. Check the depth and the width of the cut, the cutter rotation, plus the speed of the cutter and the power feed before starting the machine.

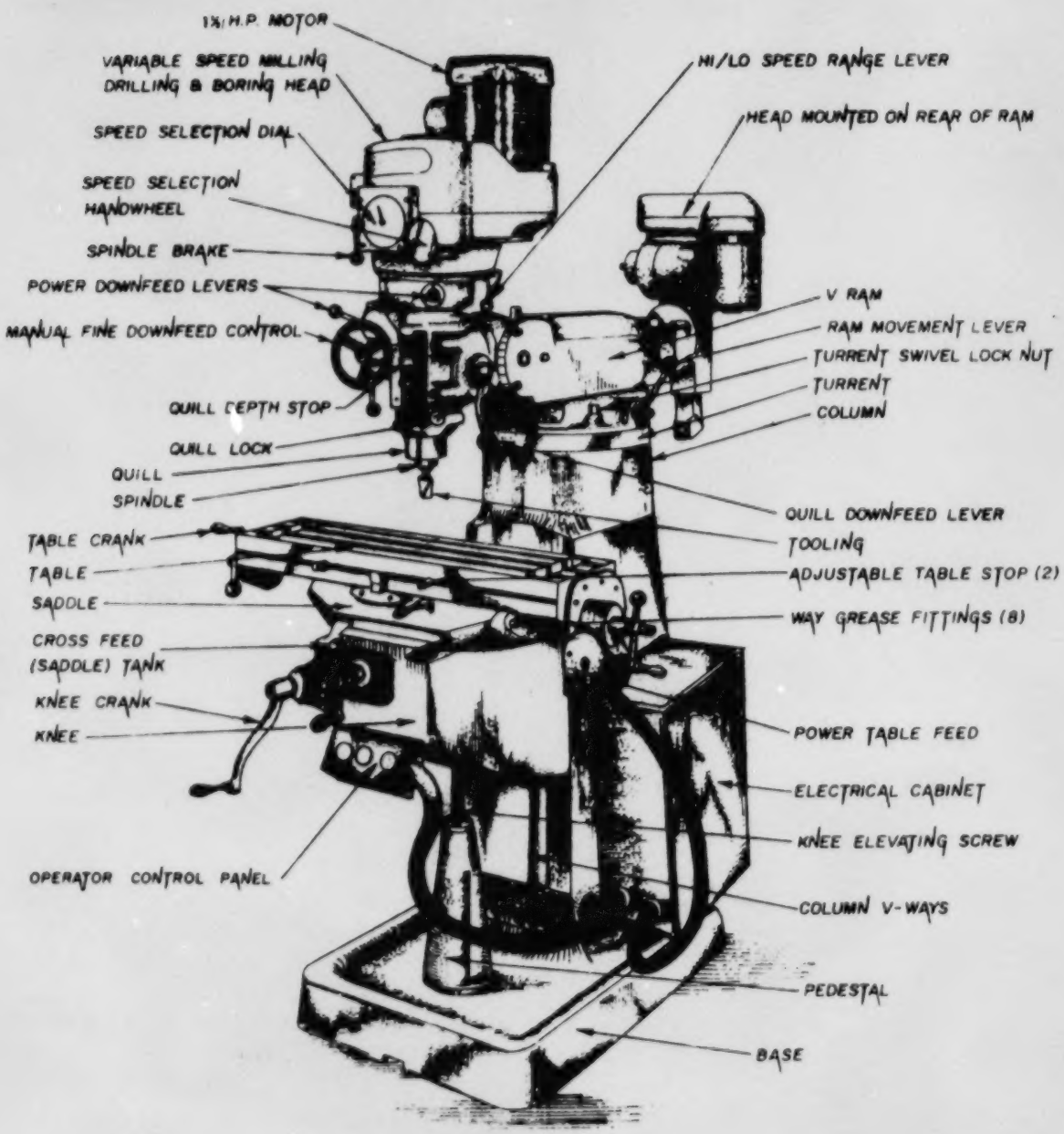
29. Never clear chips away while the machine is in operation. Keep your hands away from the chips and the point of operation.

TRANSPARENCY MASTER



HORIZONTAL MILLING MACHINE

TRANSPARENCY MASTER



VERTICAL MILLING MACHINE

SAFETY TEST FOR THE MILLING MACHINE

Name: _____ Class: _____ Date: _____

Multiple Choice. For each item below select the one best answer. Then write the letter that represents your choice on the line to the left of each item. Fill in the blank for questions 6 and 7.

_____ 1. You should check all of the attachments and all of the clamps on the milling machine for tightness before:

A. Turning on the power
B. Oiling the machine
C. Changing the spindle
D. Turning off the automatic feed

_____ 2. When the cutter of the milling machine is revolving:

A. Clean the table
B. Oil the bearings
C. Clean the arbor with a cloth
D. Stand to one side of the machine

_____ 3. The best way to remove metal cuttings or chips from your work is to use:

A. Your hand
B. A clean rag
C. A brush
D. A tool

_____ 4. Striking a mill cutter with a steel hammer may:

A. Cause pieces of steel to fly
B. Break the cutter
C. Damage the arbor
D. Damage the hammer

_____ 5. When you have finished using the milling machine, you should:

A. Speed up all clutches and feeds
B. Seat work against the parallels
C. Release all automatic feeds
D. Select the proper cutter

6. The machine should be set for proper depth of _____.

7. Feed against, or opposite to, the direction of the rotation of _____.

SAFETY INSTRUCTIONS FOR OPERATING A METALWORKING SHAPER

1. Obtain permission from your instructor before using the shaper.
2. Protect your eyes with a face shield, safety glasses, or goggles.
3. Be sure fences and guards are fastened tightly in place.
4. Make adjustments or set up only when the machine is at a dead stop.
5. Use a soft hammer or a mallet to set work on the parallels.
6. Secure work firmly in the machine.
7. Select the proper tool for the job.
8. Set the machine for the proper depth of cut.
9. Be sure that ram and head will clear your work and any holding device.
10. Use the proper file to remove sharp burrs and corners to prevent fingers from being cut.
11. Make sure that no one except you is inside the operator's zone.
12. Check to see that the lever is in a neutral position before starting the motor.
13. Stand to one side of the machine.
14. Turn on the power after permission is given.
15. Keep your hands away from the cutting tool and the line of travel of all moving parts.
16. Turn off the power after using the shaper, and stand by until the machine has stopped.
17. Clean the machine and the area with a brush.
18. Make sure all guards are secure before starting the machine.
19. Do not lay either the tools or tooling on any part of the machine.
20. Never remove chips while the machine is in motion.

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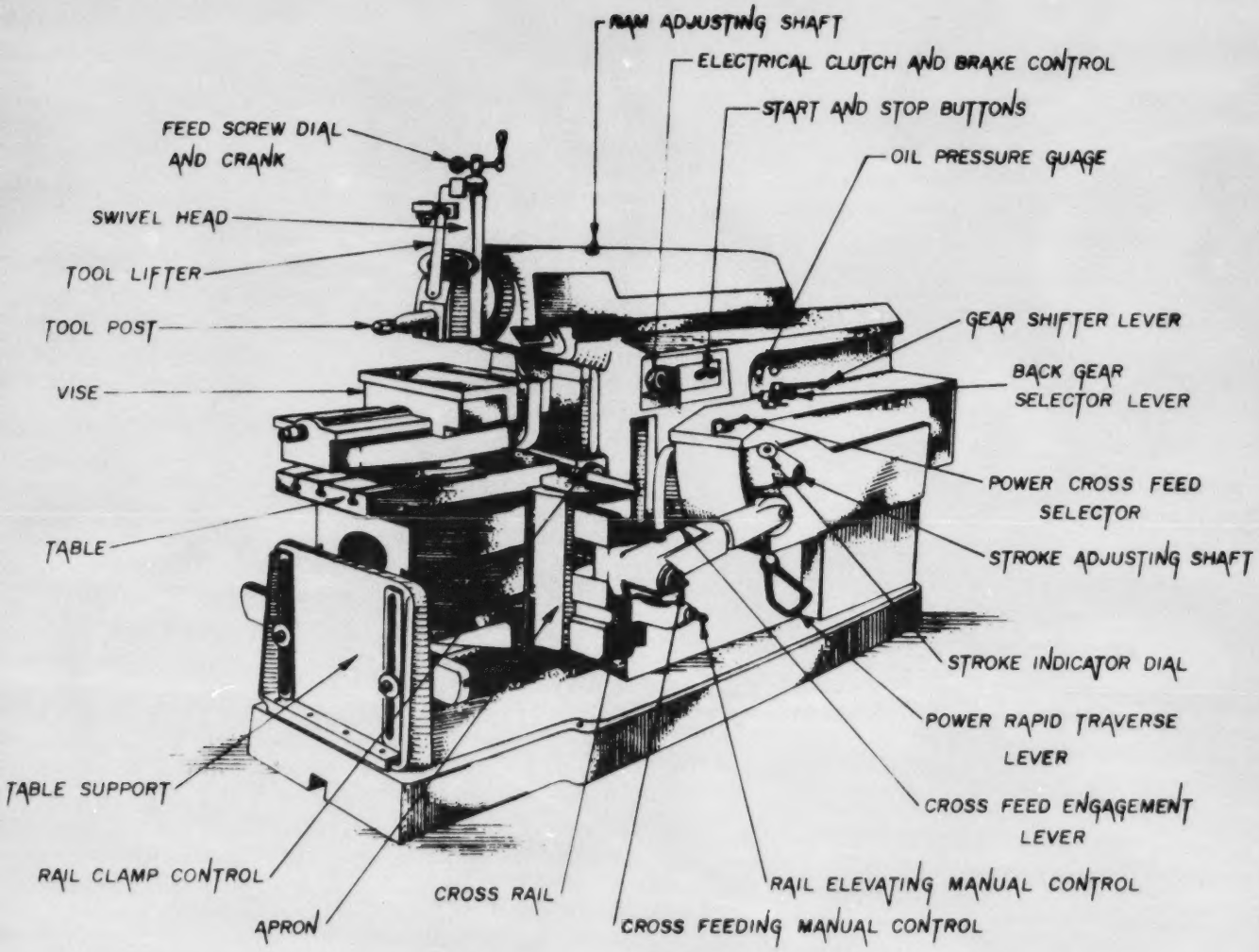


METALWORKING SHAPER

SAFETY TEST FOR THE METALWORKING SHAPER

Name:_____ Class:_____ Date:_____

Multiple Choice. For each item below select the one best answer. Then write the letter that represents your choice on the line to the left of each item. Fill in the blank for questions 6 and 7.

_____ 1. When setting up a job on the shaper, be certain:

A. There are no chips on the vise
B. Your work is securely fastened in the machine
C. The stroke of the ram is at least 3 inches long
D. The machine is in gear

_____ 2. Before starting the shaper, you should make sure that the ram and head will clear the:

A. Starting lever
B. Ram clamp
C. Stock
D. Deck

_____ 3. When operating a shaper, you should:

A. Oil the machine
B. Sweep the chips from the floor immediately
C. Wear a face shield or safety glasses
D. Increase the cutting speed

_____ 4. You should use a file to remove sharp burrs and corners from any work to:

A. Prevent work from being marred
B. Avoid tearing your clothes
C. Prevent your fingers from being cut
D. Speed up production

_____ 5. When the shaper is in motion, you should:

A. Lean on the ram
B. Sit near by and watch
C. Raise the tool holder on each back stroke
D. Keep your hands away from the work

6. Sharp burrs and corners should be removed from your work with a _____.

7. Always secure permission from the _____ before using the shaper.

SAFETY RULES TO BE OBSERVED WHILE OPERATING THE MACHINE LATHE

1. Obtain permission from the instructor before operating the lathe.

2. Wear proper clothing.

3. Wear a face shield, safety glasses, or goggles.

4. Clamp the tailstock and adjust the tool rest before starting the lathe. Be sure the chuck key is removed.

5. Turn the lathe by hand while putting on or removing a face plate or chuck. Power is never to be used.

6. Make any adjustment of the cutting tool or measurements on the work when the lathe is not running.

7. Remove chips from the work and from the machine with a brush. Fingers should never be used.

8. Always keep your left arm and body a safe distance from the lathe dog.

9. Never reverse the lathe until it has fully stopped.

10. Remove the tool bit from the holder when taking work from the lathe or changing chucks.

11. If you are in doubt about what to do, ask the instructor.

SAFETY TEST FOR THE MACHINE LATHE

Name:_____ Class:_____ Date:_____

I. Multiple Choice. For each item below select the one best answer. Then write the letter that represents your choice on the line to the left of each item. Fill in the blanks for 5 through 8.

_____ 1. Measurements should be made when the lathe is at a dead stop so as to:

A. Avoid damaging the measuring tool
B. Prevent the measuring instrument from getting caught and flying out
C. Make faster measurements
D. Keep the chuck tight

_____ 2. Remove the tool bit holder:

A. When taking work from the lathe or changing the chucks
B. In such a manner that it will not fall on the floor
C. On the carriage
D. In the chip pan

_____ 3. To prevent the possibility of the chuck key or the wrench from flying out of the lathe chuck, you should:

A. Operate the lathe at low speed
B. Tighten the chuck
C. Remove the key or wrench immediately after using
D. Use a key or a wrench that fits securely

_____ 4. Lathe chips are:

A. Removed from the work and the machine with a brush
B. Cut from aluminum and brass only
C. Likely to burn and cut if you grasp them
D. Safe to handle

5. Shifting gears and changing levers on the lathe should only be done when the machine is _____.

6. Always keep your left arm and body a safe distance from _____.

7. Before starting the lathe, you should see that it turns freely by rotating it by _____.

8. When making cuts, flying chips are a hazard. You must wear _____.

SAFETY TEST FOR OXYGEN-ACETYLENE WELDER

Name: _____ Class: _____ Date: _____

I. Multiple Choice. For each item below select the one best answer. Then write the letter that represents your choice on the line to the left of each item.

_____ 1. You should make sure welding equipment is:

A. Lubricated with oil
B. Tightened by hand
C. Kept free of oil and grease
D. Lubricated weekly

_____ 2. Welding goggles are worn because they:

A. Magnify your work
B. Protect your eyes from dust
C. Help you concentrate on your work
D. Protect your eyes against heat, rays, and sparks

_____ 3. The valve on a cylinder of acetylene should be opened:

A. With a pair of pliers
B. Three full turns
C. One and one-fourth turns or less
D. As many turns as possible

_____ 4. When you light a welding torch, you should use a:

A. Friction torch lighter
B. Match
C. Fluid lighter
D. Piece of lighted paper

_____ 5. If a welding torch backfires, you should:

A. Dip the torch in water
B. Inspect the hose
C. Hang an out-of-order sign on equipment
D. Close the acetylene valve first

II. True-False. If you believe the statement is true, circle the "T." If you believe it is false, circle the "F."

T F 1. Gas bottles may be laid on the floor when not in use.

T F 2. Closed containers are not hazardous to weld or repair.

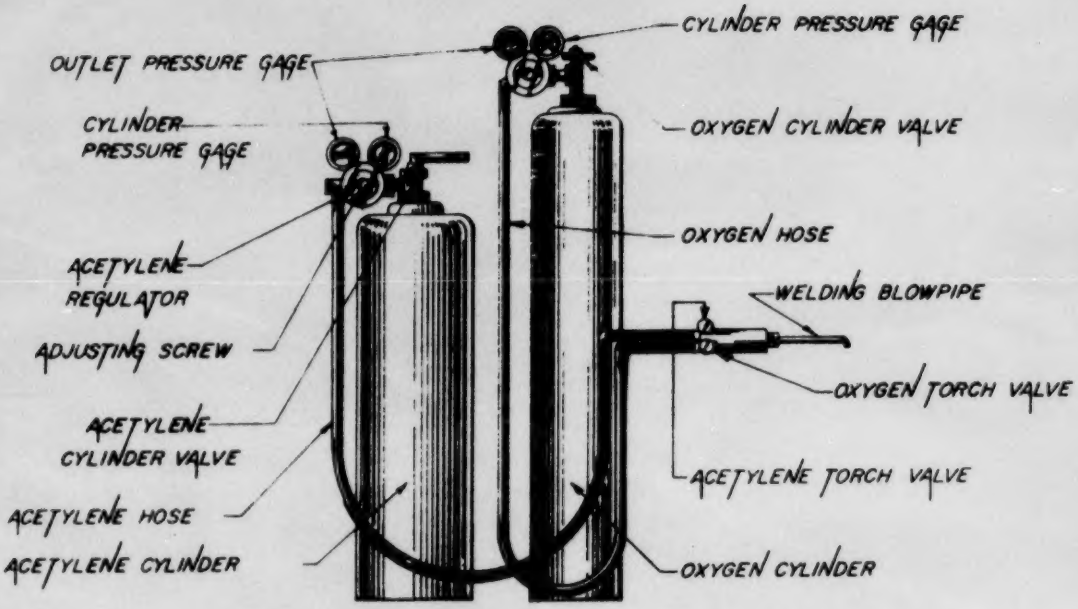
T F 3. The cylinder caps should be placed on all bottles when not in use.

T F 4. Eye protection must be worn for all welding, cutting and chipping operations.

T F 5. The equipment should not be wiped down with oily rags.

T F 6. Acetylene pressure should be set at 20 psi.

TRANSPARENCY MASTER



OXY-ACETYLENE WELDING

GENERAL SAFETY INSTRUCTIONS FOR OXYACETYLENE WELDING AND CUTTING

1. Operate only with your instructor's permission and after you have received instruction.

2. Remove jewelry; eliminate loose clothing; and confine long hair.

3. Close the cylinder valve and replace the protective cover before moving the cylinder.

4. Fasten cylinders with a chain or other suitable device as a protection against falling or rolling.

5. Inspect all hoses before using.

6. Make sure that all hoses are properly connected and that all connections are tight.

7. Report any leaking of the cylinders or the connections to the teacher immediately.

8. Make sure that you have ample ventilation while welding.

9. Keep all flammable material away from welding area.

10. When preparing to weld, release the regulator pressure screw first; then, open cylinder valves gradually.

11. Open the acetylene cylinder valve one and one-fourth turns or less. Keep the wrench in place so that the valve may be shut off quickly, if necessary.

12. Keep the acetylene pressure in the hose below 15 pounds per square inch.

13. Use a friction torch lighter to light the torch.

14. Close the acetylene valve first if the torch backfires.

15. Make certain the lighted torch always points away from yourself and others.

16. Keep the sparks and the flame away from the cylinders.

17. Close the cylinder valves when you have finished your welding job.

18. Quench the section of the metal that has been welded, or mark it with chalk, or soapstone the word "hot" on the metal, if it is necessary for you to leave your work.

19. Always use the proper eye protection, including the proper shade of lenses when welding and cutting, or safety glasses or goggles when chipping and grinding.

20. Do not allow oil to come in contact with hoses or equipment.

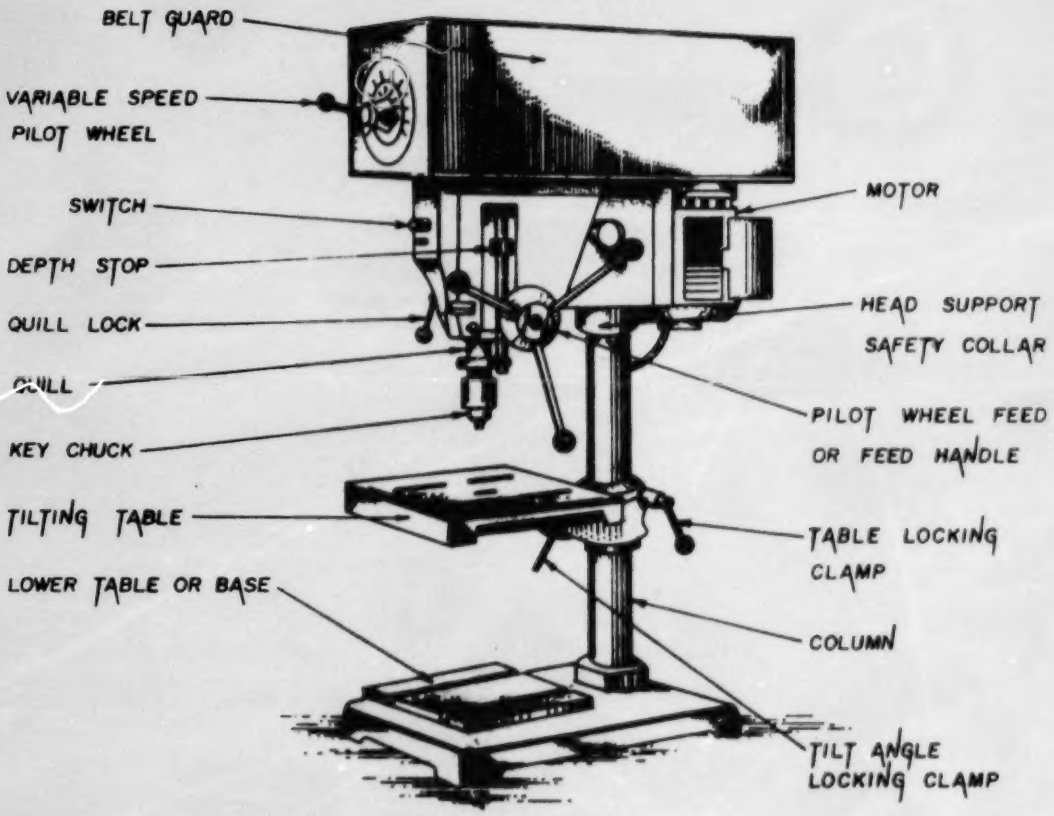
21 Keep the cylinder caps on the bottles when not in use.

22 Confine all cutting and welding to the designated area in the shop.

23. Do not weld galvanized metal without the proper ventilation.

24. Do not weld or cut on a closed container without your instructor's approval.

TRANSPARENCY MASTER



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SMALL ENGINE SUPPLEMENTAL SAFETY INSTRUCTIONAL PACKET

GENERAL SAFETY INSTRUCTIONS FOR SMALL ENGINES

1. Pull the spark plug wire off of the spark plug before attempting any repairs.
2. Do not work around the fan blade while the engine is running.
3. Never check the motor oil with the engine running.
4. Operate engine only where there is adequate ventilation.
5. Never drain gasoline around a hot engine or in a closed area.
6. Always wear safety glasses when operating on an engine or working with any solvents.
7. Never let the starter cord snap back.
8. Be sure the engine is properly mounted before attempting to operate it.
9. Never pull off a spark plug wire while the engine is still running.
10. Never start a lawn mower in stones or dirt while people are near.
11. Never examine or turn a mower blade without securing the spark plug wire away from the spark plug.
12. Exercise caution when disassembling spring-loaded parts.
13. Consider the engine—and especially the exhaust muffler—hot until checked and found to be otherwise.
14. Do not run an engine without the blower housing as well as all other items in place.
15. Do not lift heavy objects alone. Seek sufficient help.
16. Do not use your mouth to start the siphon hose.
17. Use compressed air with caution. Do not blow toward others.
18. If oil or grease is spilled on the floor, clean it up immediately.
19. Keep your work area clean.
20. Put all tools away when you finish using them.

GENERAL SAFETY TEST FOR SMALL ENGINE REPAIR

Name: _____ Class: _____ Date _____

I. Multiple Choice. For each item below select the one best answer. Then write the letter that represents your choice on the line to the left of each item.

_____ 1. Before attempting any repairs to a small engine, you should:

A. Fill the tank with gasoline
B. Drain the oil
C. Pull the spark plug wire off the spark plug
D. Check the spark

_____ 2. When test running a repaired mower engine, the engine can often be safely run without:

A. A blade
B. The blower housing in place
C. Engine oil
D. Securely mounting the engine

_____ 3. The largest danger in operating a mower in stone or dirt is that:

A. The engine will get dirty
B. The oil will need changing
C. The blade will get dull
D. Stone or dirt may be thrown out at the operator or someone else

_____ 4. The part of the small engine that gets hot the fastest, and could quickly burn the operator, is:

A. The carburetor
B. The blower housing
C. The flywheel
D. The muffler

_____ 5. When your repair work is completed, you should:

A. Clean up your tools and put them away
B. Clean up your work area
C. Dispose of used oil and old gasoline properly
D. All of the above

_____ 6. Dirt and grit should be cleaned off your clothing and arms with:

A. A rag
B. Compressed air
C. Gasoline
D. Parts cleaner

II. True-False. If you believe the statement is true, circle the "T." If you believe it is false, circle the "F."

T F 1. On most engines, the oil can be checked with the engine running.

T F 2. You should never examine or turn a mower blade without first securing the spark plug wire away from the spark plug.

T F 3. Small engines should be tested in a well ventilated area.

T F 4. When needing gasoline to run an engine, gasoline may be siphoned out of an automobile tank using a hose and your mouth.

SAFETY INSTRUCTIONS FOR USING AND HANDLING STORAGE BATTERIES

The storage battery that you are most likely to come in contact with is the automotive storage battery. Because of its compact size and the fact that it is so common, we sometimes tend to become careless in our use of the battery.

Some of the more serious potential hazards from batteries are:

1. Explosions due to improper connections.

2. Acid spills by incorrect handling.

3. Back strain from improper lifting.

You must observe the following safety instructions for using storage batteries.

Handling Batteries

1. Obtain permission from your instructor before servicing or charging a storage battery.

2. Use proper instruments for testing a storage battery.

3. Avoid overfilling a battery, especially if it is to be charged.

4. Use water and baking soda (a neutralizer) to clean off the top of a battery.

5. Handle a battery or acid with care. Wash immediately any part of your body or clothing that comes in contact with acid.

6. Wash your hands immediately after handling a battery.

Changing Batteries

1. Wear goggles while using a charger.

2. Provide ample ventilation when using a charger.

3. Remove the cell covers before charging a battery (unless the covers have other instructions on them).

4. Keep open flames and sparks away from a battery being charged.

5. Turn off the charger before disconnecting the leads (wires) from the charger to the battery.

6. Replace the cell covers before moving the battery.

7. When using jumper cables, connect the ground wire last. Disconnect the ground wire first.

SAFETY TEST FOR USING AND HANDLING STORAGE BATTERIES

Name:_____ Class:_____ Date:_____

I. Multiple Choice. For each item below select the one best answer. Then write the letter that represents your choice on the line to the left of each item.

_____ 1. You should test a storage battery with:

A. A pair of pliers
B. A screwdriver
C. An analyzer or tester
D. A piece of wire

_____ 2. A good neutralizer for cleaning off the top of a storage battery is water and:

A. Borax
B. Baking soda
C. Lye
D. Lime

_____ 3. It is best to charge storage batteries in a well ventilated room because the gas given off during charging is:

A. Explosive
B. Not dangerous
C. Nonexplosive
D. Carbon monoxide

_____ 4. Before disconnecting the leads (wires) from the charger to the storage battery, you should:

A. Replace the cell covers
B. Check with a tester
C. Close the windows
D. Turn off the charger

_____ 5. A battery should be removed and carried with:

A. Leather gloves
B. Pliers
C. Battery lifter
D. The caps off

_____ 6. An open flame near a storage battery may cause:

A. Faster charging
B. An explosion
C. Slower charging
D. The electrolite to leak out

_____ 7. When using jumper cables, which connection should be made last?

A. A positive cable to a dead battery
B. A positive cable to a charged battery
C. A negative cable to a dead battery
D. A negative cable to a charged battery

II. True-False. If you believe the statement is true, circle the "T." If you believe it is false, circle the "F."

T F 1. Generally, all caps should be left on the battery when charging it.

T F 2. Goggles should be worn when using a battery charger.

T F 3. Before charging a battery, the cells should be filled to the top of the filler openings.

SAFETY INSTRUCTIONS FOR OPERATING THE BUFFER

1. Obtain permission from your instructor before using the buffer.
2. Wear a face shield, safety glasses, or goggles.
3. Hold work with both hands.
4. Secure special instruction and permission from your instructor before small pieces are buffed.
5. Make sure that no one except you is inside the operator's zone.
6. Turn on the power only after permission is given.
7. Apply the compound sparingly.
8. Keep your hands away from the wheel while it is in motion.
9. Hold the work below center (horizontal axis) as the wheel revolves toward you.
10. Buff the flat surfaces from the center toward the lower edge. Sharp edges should point downward.
11. Press the material against the wheel with the correct amount of pressure.
12. Turn off the power after using the buffer.
13. Clean the buffer and the area with a brush.

SAFETY TEST FOR THE BUFFER

Name: _____ Class: _____ Date: _____

I. Multiple Choice. For each item below select the one best answer. Then write the letter that represents your choice on the line to the left of each item.

_____ 1. When buffing, you should hold your work:

A. On top of the wheel
B. Below the center (horizontal axis) of the wheel
C. Above the center (horizontal axis) of the wheel
D. On the bottom of the wheel

_____ 2. You must wear goggles or a face shield when using the buffer because either of these will:

A. Magnify your work
B. Remove any glare
C. Help avoid distraction
D. Protect your eyes from flying particles

_____ 3. Special permission to buff small pieces must be obtained from:

A. The foreman
B. The teacher
C. The student
D. The monitor

_____ 4. When using a buffer, you should point the sharp edges of your work:

A. Upward
B. Sideways
C. Horizontal
D. Downward

II. Fill in the Blanks.

1. When using a buffer, you should always keep your hands away from _____.

2. Be sure when using a buffing wheel to wear a face shield or _____.

3. Both the buffer and the surrounding area should be cleaned with a _____.

4. Use the correct amount of pressure to press _____ against the wheel.

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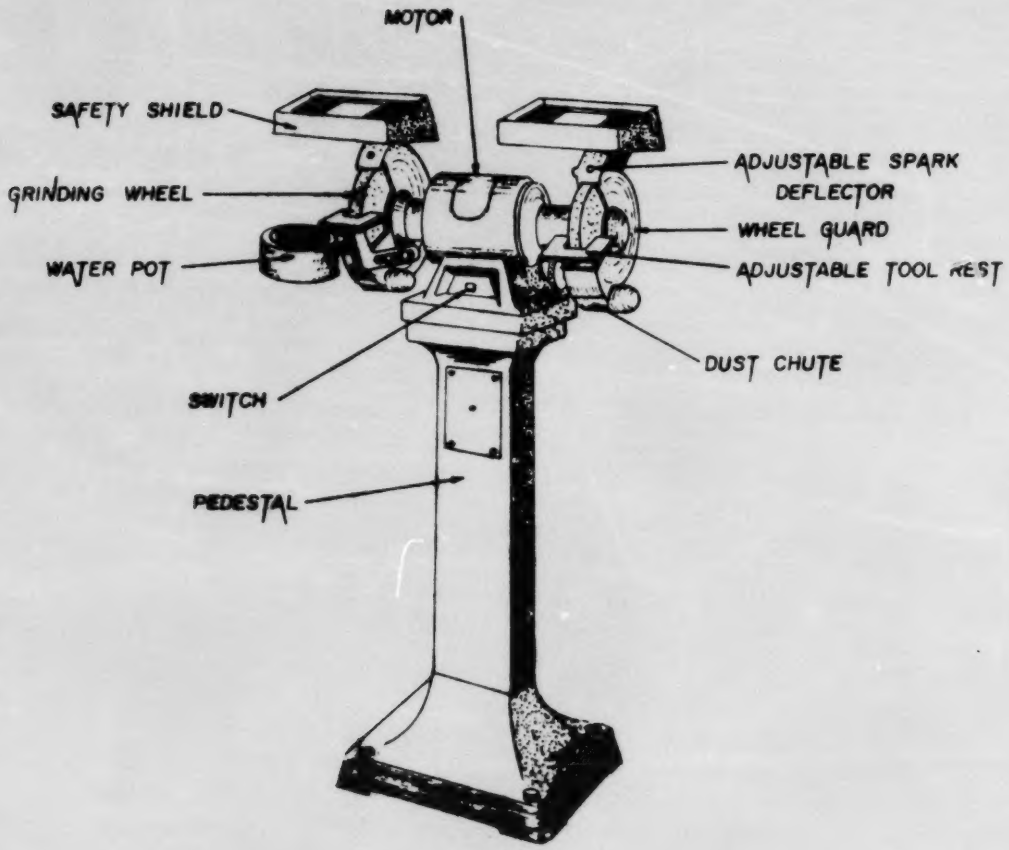


PEDESTAL GRINDER

SAFETY INSTRUCTIONS FOR OPERATING THE GRINDER

1. Obtain permission from the instructor before operating the grinder.
2. Wear proper clothing.
3. Wear a face shield, safety glasses, or goggles, and use a glass safety guard on the grinder.
4. See that the guard is in place.
5. Set the tool rest 1/16" to 1/8" from the wheel.
6. Dress the wheel when necessary.
7. Make sure that no one except you is inside the operator's zone.
8. Adjust the grinder for your job before turning the power on.
9. Stand to one side of the wheel when turning power on. The wheel may be cracked, causing it to break up.
10. Turn on the power after permission is given.
11. Keep your hands away from the wheel while it is in motion.
12. Hold your work with your hands. Ask permission to grind small pieces.
13. Use only the face of the wheel.
14. Press materials against the wheel with the correct amount of pressure.
15. Keep the work in motion across the face of the wheel.
16. Do not grind on the side of the grinding wheels.
17. Stand to one side when starting the machine.
18. Discard or report to the teacher grinding wheels that are excessively small or cracked.
19. Hold small work pieces with a "vise grip" type of pliers.
20. Do not leave the machine until the grinding wheels have come to a full stop.

SAFETY TEST FOR GRINDER

Name: _____ Class: _____ Date: _____

Multiple Choice. For each item below select the one best answer. Then write the letter that represents your choice on the line to the left of each item. Fill in the blank for questions 6 and 7.

_____ 1. You must wear a face shield or safety glasses when using a grinder because such equipment:

A. Is becoming to you
B. Magnifies the work, thus making it easier for you to see
C. Protects your eyes from bright light
D. Protects your eyes from flying particles

_____ 2. Adjust the grinder tool rest:

A. Immediately after the grinder is turned on
B. Before turning on the power
C. When wheel is not in motion
D. After power is turned off and the wheel is coasting

_____ 3. You should set the grinder tool rest:

A. 1/4" away from wheel
B. So the wheel rubs lightly against the tool rest
C. 1/2" away from the wheel
D. No more than 1/8" from the wheel

_____ 4. To grind small pieces of stock, you should:

A. Hold them in your bare hands
B. Hold them with a rag
C. Use a coarse wheel
D. Receive special instruction and permission from the instructor

_____ 5. You should stand to one side of the grinding wheel while it is gathering speed because:

A. It may have a defect, and the wheel will fly to pieces
B. The air currents from the wheel are unhealthy
C. It will tempt you to use the wheel too soon and cause it to stop
D. You can see if the wheel is running true

6. When using the grinder, you should keep your hands away from the _____.

7. To grind small pieces of stock, you should ask permission from the _____.

GENERAL SAFETY INSTRUCTIONS FOR OXYACETYLENE WELDING AND CUTTING

1. Operate only with your instructor's permission, and after you have received instruction.

2. Remove any jewlry; eliminate loose clothing; and confine long hair.

3. Close the cylinder valve and replace the protective cover before moving the cylinder.

4. Fasten the cylinders with a chain or other suitable device as a protection against falling or rolling.

5. Inspect all hoses before using.

6. Make sure that hoses are properly connected and that all connections are tight.

7. Report any leaking of the cylinders or connections to your teacher immediately.

8. Make sure you have ample ventilation while welding.

9. Keep all flammable material away from welding area.

10. When preparing to weld, release the regulator pressure screw first; then open the cylinder valves gradually.

11. Open the acetylene cylinder valve one and one-fourth turns or less. Keep a wrench in place so that the valve may be shut off quickly, if necessary.

12. Keep the acetylene pressure in the hose below 15 pounds per square inch.

13. Use a friction torch lighter to light the torch.

14. Close the acetylene valve first, if the torch backfires.

15. Make certain a lighted torch always points away from yourself and others.

16. Keep the sparks and flame away from cylinders.

17. Close the cylinder valves when you have finished your welding job.

18. Quench a section of metal that has been welded, or mark it with chalk, or soapstone the word "hot" on the metal, if it is necessary for you to leave your work.

19. Always use proper eye protection, the proper shade of lenses when welding and cutting, and safety glasses or goggles when chipping and grinding.

20. Do not allow any oil to come in contact with the hoses or the equipment.

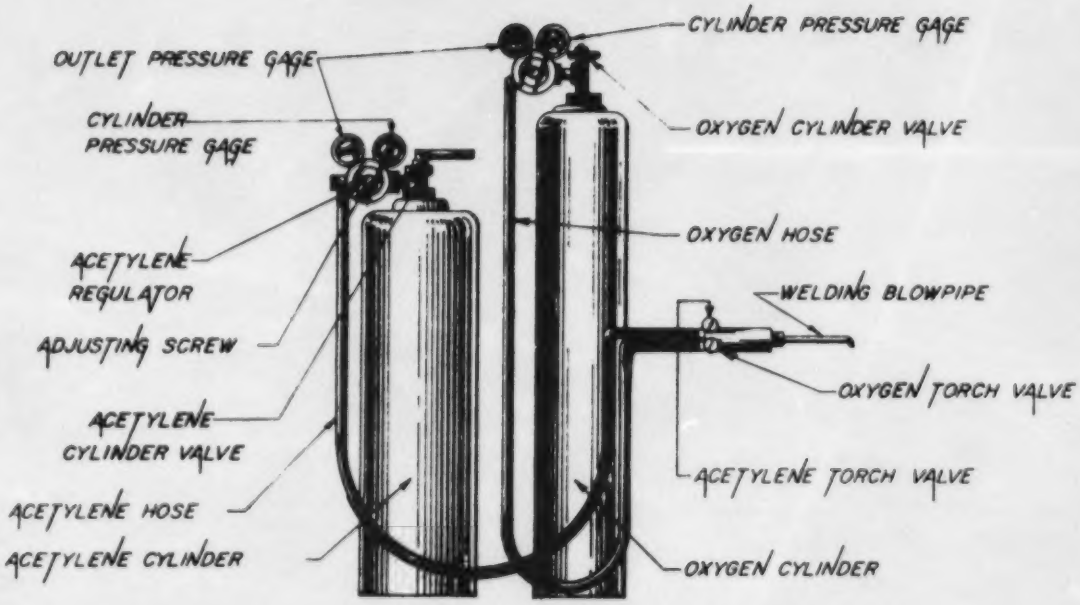
21. Keep the cylinder caps on the bottles when not in use.

22. Confine all cutting and welding to the designated area in the shop.

23. Do not weld galvanized metal without proper ventilation.

24. Do not weld or cut on a closed container without your instructor's approval.

TRANSPARENCY MASTER



OXY-ACETYLENE WELDING

SAFETY TEST FOR OXYGEN-ACETYLENE WELDER

Name: _____ Class: _____ Date: _____

I. Multiple Choice. For each item below select the one best answer. Then write the letter that represents your choice on the line to the left of each item.

_____ 1. You should make sure the welding equipment is:

A. Lubricated with oil
B. Tightened by hand
C. Kept free of oil and grease
D. Lubricated weekly

_____ 2. Welding goggles are worn because they:

A. Magnify your work
B. Protect your eyes from dust
C. Help you concentrate on your work
D. Protect your eyes against heat, rays, and sparks

_____ 3. The valve on a cylinder of acetylene should be opened:

A. With a pair of pliers
B. Three full turns
C. One and one-fourth turns, or less
D. As many turns as possible

_____ 4. When you light a welding torch, you should use a:

A. Friction torch lighter
B. Match
C. Fluid lighter
D. Piece of lighted paper

_____ 5. If a welding torch backfires, you should:

A. Dip the torch in water
B. Inspect the hose
C. Hang an out-of-order sign on the equipment
D. Close the acetylene valve first

II. True-False. If you believe the statement is true, circle the "T." If you believe it is false, circle the "F."

T F 1. Gas bottles may be laid on the floor when not in use.

T F 2. Closed containers are not hazardous to weld or repair.

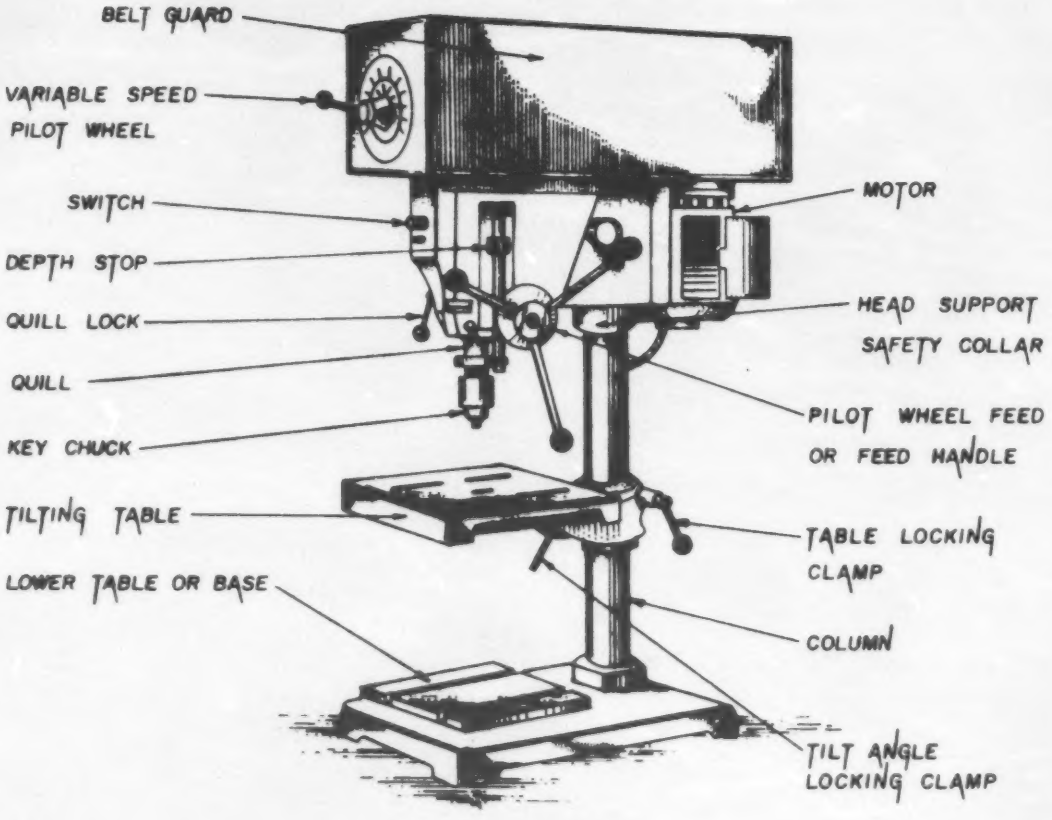
T F 3. The cylinder caps should be placed on all bottles when not in use.

T F 4. Eye protection must be worn for all welding, cutting and chipping operations.

T F 5. The equipment should not be wiped down with oily rags.

T F 6. Acetylene pressure should be set at 20 psi.

TRANSPARENCY MASTER



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WELDING SUPPLEMENTAL SAFETY INSTRUCTIONAL PACKETS

GENERAL SAFETY INSTRUCTIONS FOR OXYACETYLENE WELDING AND CUTTING

1. Operate only with your instructor's permission and after you have received instruction.
2. Remove any jewelry; eliminate loose clothing; and confine long hair.
3. Close the cylinder valve and replace the protective cover before moving the cylinder.
4. Fasten the cylinders with a chain or another suitable device as a protection against falling or rolling.
5. Inspect all hoses before using.
6. Make sure that the hoses are properly connected and that all connections are tight.
7. Report any leaking of the cylinders or the connections to your teacher immediately.
8. Make sure you have ample ventilation while welding.
9. Keep all flammable material away from welding area.
10. When preparing to weld, release regulator pressure screw first, then open the cylinder valves gradually.
11. Open the acetylene cylinder valve one and one-fourth turns, or less. Keep a wrench in place so that a valve may be shut off quickly, if necessary.
12. Keep acetylene pressure in the hose below 15 pounds per square inch.
13. Use a friction torch lighter to light the torch.
14. Close the acetylene valve first if the torch backfires.
15. Make certain the lighted torch always points away from yourself and others.
16. Keep sparks and flame away from cylinders.
17. Close the cylinder valves when you have finished your welding job.
18. Quench the section of metal that has been welded, or mark with chalk, or soapstone the word "hot" on the metal, if it is necessary for you to leave your work.
19. Always use proper eye protection, the proper shade of lenses when welding and cutting; and safety glasses or goggles when chipping and grinding.

20. Do not allow any oil to come in contact with hoses or equipment.

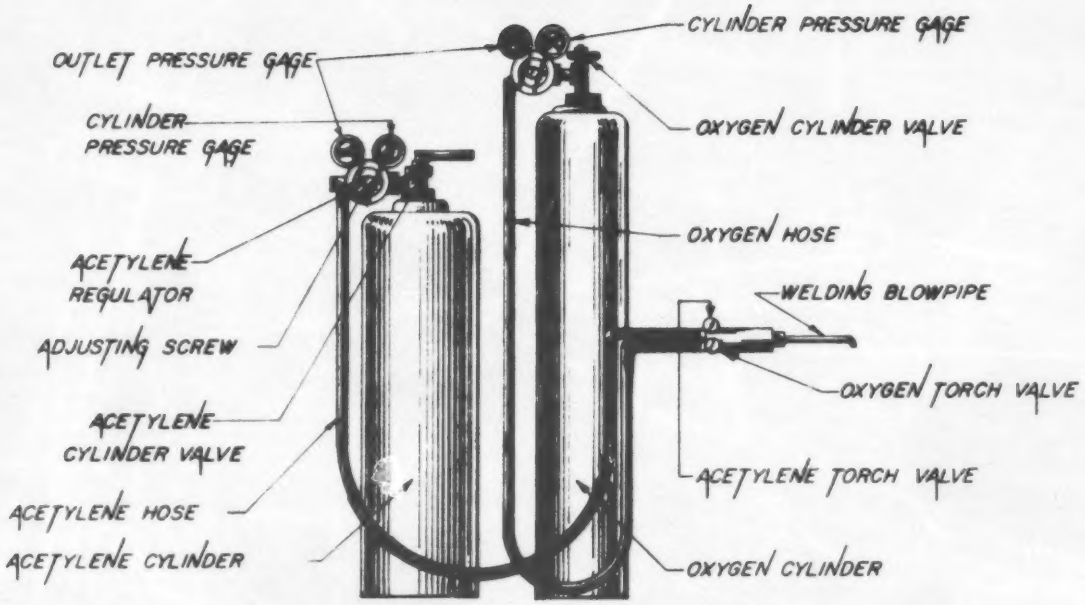
21. Keep the cylinder caps on the bottles when not in use.

22. Confine all cutting and welding to the designated area in the shop.

23. Do not weld any galvanized metal without the proper ventilation.

24. Do not weld or cut on a closed container without your instructor's approval.

TRANSPARENCY MASTER



OXY-ACETYLENE WELDING

SAFETY TEST FOR OXYGEN-ACETYLENE WELDER

Name: _____ Class: _____ Date: _____

I. Multiple Choice. For each item below select the one best answer. Then write the letter that represents your choice on the line to the left of each item.

_____ 1. You should make sure welding equipment is:

A. Lubricated with oil
B. Tightened by hand
C. Kept free of oil and grease
D. Lubricated weekly

_____ 2. Welding goggles are worn because they:

A. Magnify your work
B. Protect your eyes from dust
C. Help you concentrate on your work
D. Protect your eyes against heat, rays, and sparks

_____ 3. The valve on a cylinder of acetylene should be opened:

A. With a pair of pliers
B. Three full turns
C. One and one-fourth turns, or less
D. As many turns as possible

_____ 4. When you light a welding torch, you should use a:

A. Friction torch lighter
B. Match
C. Fluid lighter
D. Piece of lighted paper

_____ 5. If a welding torch backfires, you should:

A. Dip the torch in water
B. Inspect the hose
C. Hang an out-of-order sign on the equipment
D. Close the acetylene valve first

II. True-False. If you believe the statement is true, circle the "T." If you believe it is false, circle the "F."

T F 1. Gas bottles may be laid on the floor when not in use.

T F 2. Closed containers are not hazardous to weld or repair.

T F 3. The cylinder caps should be placed on all bottles when not in use.

T F 4. Eye protection must be worn for all welding, cutting and chipping operations.

T F 5. The equipment should not be wiped down with oily rags.

T F 6. Acetylene pressure should be set at 20 psi.

GENERAL SAFETY INSTRUCTIONS FOR ELECTRIC ARC WELDING

1. Obtain permission from your instructor before using an electric welder.
2. Wear a hood with a proper observation window, treated gauntlet gloves, and treated leather apron. All assistants and observers must also wear this equipment.
3. Wear rubber soled shoes, without tracks, when electric welding.
4. When operating the electric welder, allow no one to look at the arc without the dark shield.
5. Make sure electric welding is done only in a correctly constructed booth or room, or behind proper screens.
6. Make sure there is ample ventilation while welding.
7. Keep all flammable material away from the work area.
8. See that the floor area is clear of all obstructions.
9. Report to the instructor at once if the electrode holder, the holder cable connection, the cable terminals at the welding machine, the ground clamps, the lugs, or the cable get hot.
10. While removing the scale from the work, wear ordinary safety glasses or goggles.
11. Have a fire extinguisher handy when electric welding.
12. Hang up the electrode holder and turn off the welder when work is being changed or when work has been completed.
13. Keep your sleeves and pants' cuffs rolled down and your collar buttoned up.
14. Be sure that the tops of your shoes are covered while welding
15. Keep the cable from contacting any hot metal.
16. Keep any electrode stubs off the floor. They could easily cause a slip or fall.
17. Avoid the inhalation of fumes while welding galvanized steel, phosphor bronze, and stainless steel.

SAFETY TEST FOR ELECTRIC ARC WELDER

Name:_____ Class:_____ Date:_____

I. Multiple Choice. For each item below select the one best answer. Then write the letter that represents your choice on the line to the left of each item.

_____ 1. The observation window in your welding helment is cracked. It will:

A. Allow dust to pass through it
B. Obstruct your view
C. Transmit infrared and ultraviolet rays
D. Rattle every time the helmet is flipped

_____ 2. When you are through using the electrode holder, you should:

A. Place it on a metal workbench
B. Clamp it on the metal frame of the workbench
C. Rest it on the floor
D. Suspend it so that it will not touch any metal

_____ 3. If a cable or the electrode holder overheats, you should:

A. Notify your instructor
B. Turn the voltage down
C. Stop welding and wait until it cools
D. Change the electrode holder

_____ 4. You should always draw the curtains on the welding booth before you strike an arc so as to:

A. Protect your eyes from the infrared and ultraviolet rays
B. Keep the work from getting cool
C. Prevent anyone from noticing any mistakes
D. Protect anyone nearby from the infrared and ultraviolet rays

_____ 5. Before leaving heated metal unattended, you should use chalk or soapstone to label it with the word "hot" because:

A. Someone may be burned if he/she touches it
B. Other work may be placed on it
C. You can tell to whom it belongs
D. Chalk will help cool it

II. Fill in the blanks.

1. For eye protection against infrared and ultraviolet rays, you must wear a welding _____.

2. When chipping slag, you must wear _____.

3. Arc welding should be done only behind proper screens or in a _____.

4. If your skin is exposed to electric arc rays, you will be _____.

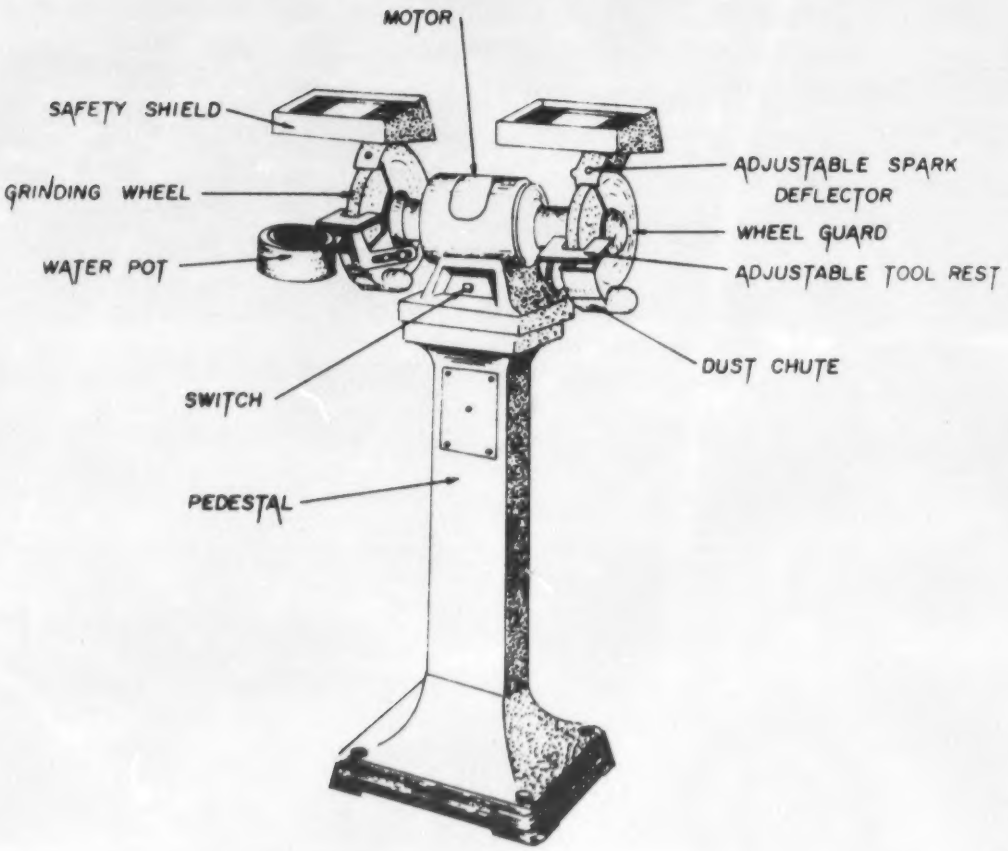
5. A _____ should be near when electric welding.

6. The welding area should be well _____.

SAFETY INSTRUCTIONS FOR OPERATING THE GRINDER

1. Obtain permission from the instructor before operating the grinder.
2. Wear proper clothing.
3. Wear a face shield, safety glasses, or goggles, and use a glass safety guard on the grinder.
4. See that the guard is in place.
5. Set the tool rest 1/16" to 1/8" from the wheel.
6. Dress the wheel when necessary.
7. Make sure that no one except you is inside the operator's zone.
8. Adjust the grinder for your job before turning on the power.
9. Stand to one side of the wheel when turning on the power. The wheel may be cracked, causing it to break up.
10. Turn on the power after permission is given by the teacher.
11. Keep your hands away from the wheel while it is in motion.
12. Hold the work with your hands. Ask permission to grind small pieces.
13. Use the face of the wheel only.
14. Press the materials against the wheel with the correct amount of pressure.
15. Keep the work in motion across the face of the wheel.
16. Do not grind on the side of the grinding wheels.
17. Stand to one side when starting the machine.
18. Discard or report to the instructor grinding wheels that are excessively small or cracked.
19. Hold small work pieces with a "vise grip" type of pliers.
20. Do not leave the machine until the grinding wheels have come to a full stop.

TRANSPARENCY MASTER



PEDESTAL GRINDER

SAFETY TEST FOR GRINDER

Name: _____ Class: _____ Date: _____

Multiple Choice. For each item below select the one best answer. Then write the letter that represents your choice on the line to the left of each item. Fill in the blank for questions 6 and 7.

_____ 1. You must wear a face shield or safety glasses when using the grinder because either one:

A. Is becoming to you
B. Magnifies the work, thus making it easier for you to see
C. Protects your eyes from bright light
D. Protects your eyes from flying particles

_____ 2. Adjust the grinder tool rest:

A. Immediately after the grinder is turned on
B. Before turning the power on
C. When the wheel is not in motion
D. After the power is turned off and the wheel is coasting

_____ 3. You should set the grinder tool rest:

A. 1/4" away from the wheel
B. So the wheel rubs lightly against the tool rest
C. 1/2" away from the wheel
D. No more than 1/8" from the wheel

_____ 4. To grind small pieces of stock, you should:

A. Hold them in your bare hands
B. Hold them with a rag
C. Use a coarse wheel
D. Receive special instruction and permission from the instructor

_____ 5. You should stand to one side of the grinding wheel while it is gathering speed because:

A. It may have a defect, and the wheel will fly to pieces
B. The air currents from the wheel are unhealthful
C. It will tempt you to use the wheel too soon and, if you do so, such action will cause it to stop
D. You can see if the wheel is running true

6. When using the grinder, you should keep your hands away from the _____.

7. To grind small pieces of stock, you should ask permission from the _____.

SAFETY INSTRUCTIONS FOR OPERATING THE TIG AND MIG WELDERS

1. Operate only with your instructor's permission and after you have received instruction.

2. Remove jewelry; eliminate loose clothing; and confine long hair.

3. Wear additional protective welding clothing, including a helmet, a long-sleeved jacket, and gloves to prevent burns from ultraviolet and infrared rays emitted while arc welding.

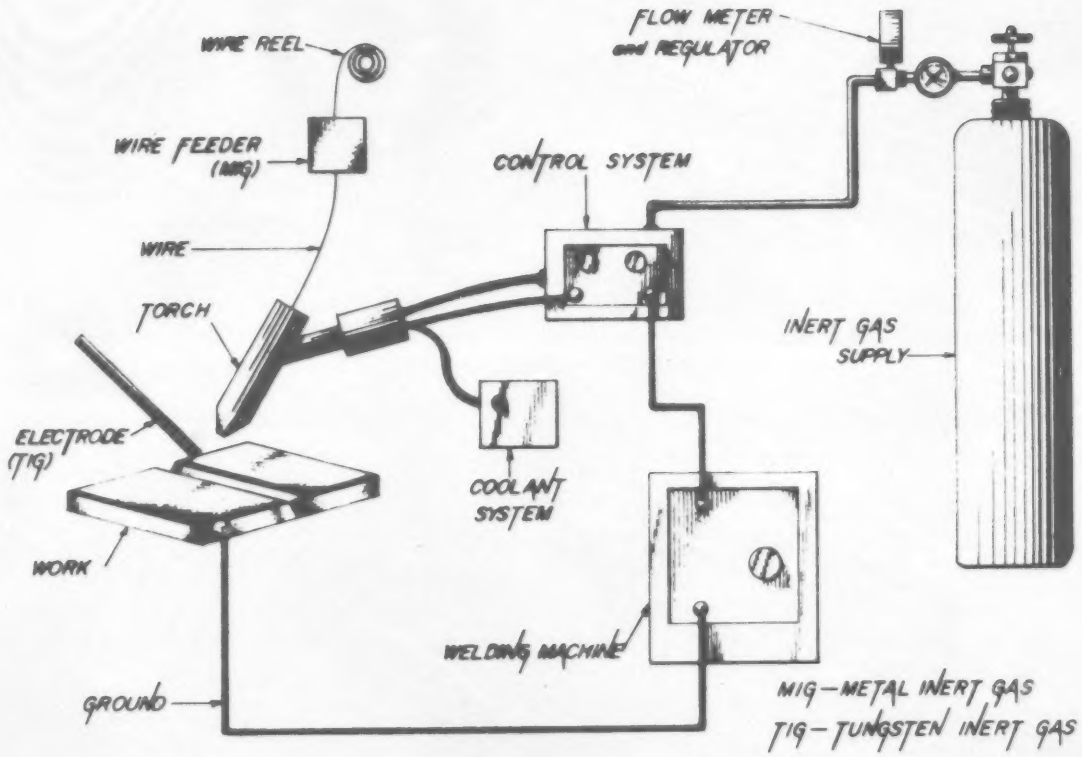
4. Ensure that the helmet used for TIG or MIG welding is equipped with a minimum number twelve density shade.

5. Be certain that the welder equipped with a high frequency stabilizing unit is installed, maintained, and used according to the recommendations of both the manufacturer and the Federal Communications Commission.

6. Never touch the tungsten electrode or MIG wire while the welder is turned on. It is electrically "hot" and can cause a serious shock.

7. Never use the high frequency when performing shield metal arc (stick electrode) welding.

TRANSPARENCY MASTER



TIG/MIG WELDING

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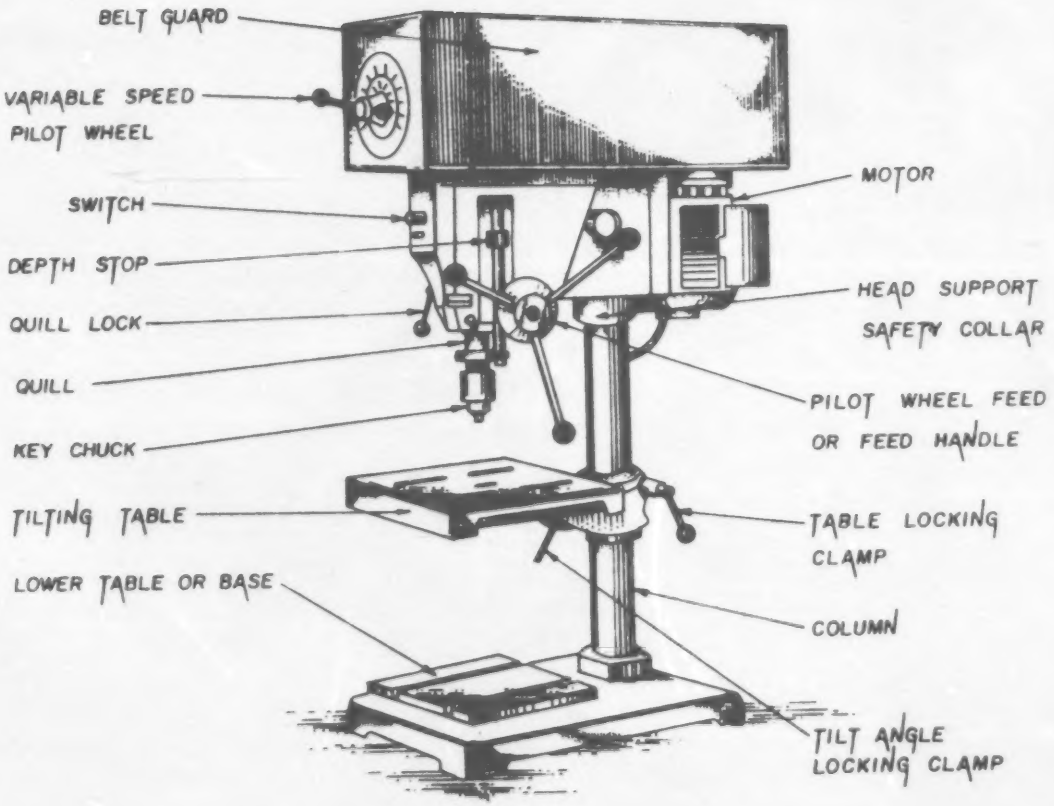

DRILL PRESS

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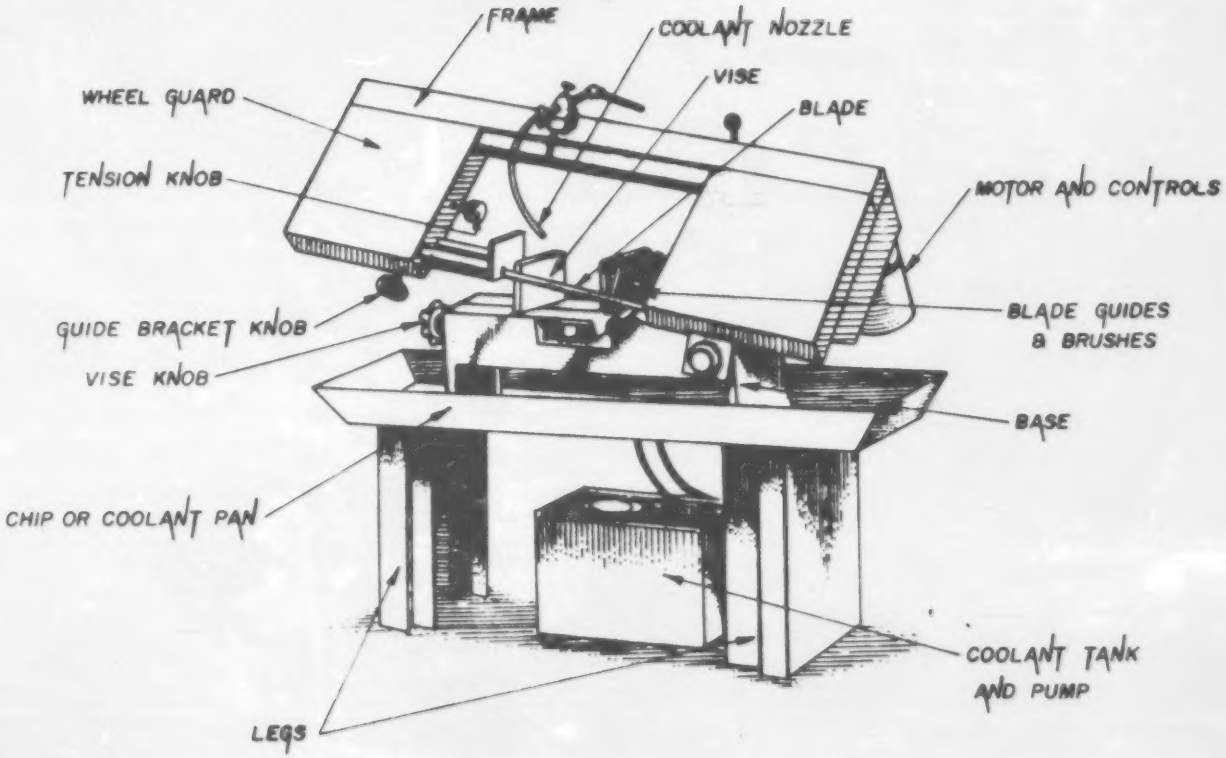
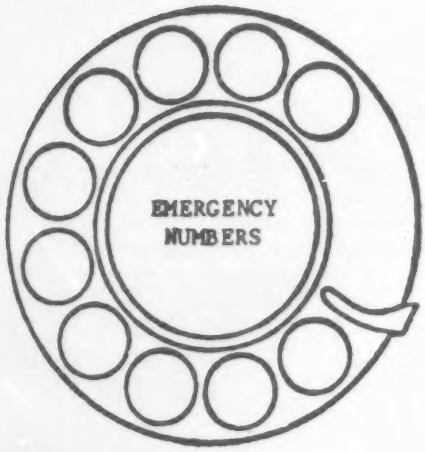


HORIZONTAL BANDSAW



PRINCIPAL/DIRECTOR .....

SCHOOL NURSE .....

DOCTOR .....

AMBULANCE .....

FIRE .....

POLICE .....

EMERGENCY EXIT INSTRUCTIONS: